

FE 1917
SIXTY-SECOND YEAR

Railway Age Gazette

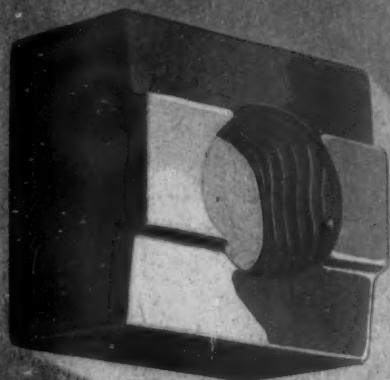
FIRST HALF OF 1917—No. 7

SIXTY-SECOND YEAR

CLEVELAND

NEW YORK—FEBRUARY 16, 1917—CHICAGO

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Railway Age Gazette

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*Illustrated.

Not a few railway executives who are specially interested in improving the effectiveness of their organizations, have been impressed, among other things, with the possibilities of system athletic or field meets as a means of interesting the men and getting them closer together. An article on another page is designed to

**Athletics
on a
Large Scale**
point out the advantages of such a program, and at the same time present a warning against rushing into it without thorough study and preparation, or when conditions are not right. On the Pennsylvania Railroad, which observed its second annual athletic meet last fall, the movement was the logical outcome of a long and steady development of athletic programs at various important points on the system. On the Missouri, Kansas & Texas, which also held its second system athletic meet last fall, the first field meet was put through in short order, but experts were called on for assistance and the executives gave critical attention to details and left no stone unturned to make it a success. Less expert assistance or a smaller interest on the part of the executives might have resulted in indifferent success, or even disaster, and thus have weakened or killed a really good movement because it was not given a fair trial.

While the large earnings of the railways in 1916 are attracting so much comment, it is interesting to note that the average **Lowest Average
Freight Rate
On Record** freight rate per ton per mile was lower in 1916 than it ever was before and that the average wage per employee for the year was greater than ever before. While the complete official figures are

not yet available, the preliminary summary of returns for the roads earning over \$1,000,000 a year, just issued by the Bureau of Railway Economics, for the fiscal year ending June 30, 1916, shows that the average receipts per ton mile were 7.07 mills, as compared with 7.22 mills for the million dollar roads for 1915, and that the average compensation per employee, excluding officers, was \$840.62 as compared with \$813.17 in 1915. The returns, which are compiled from the annual reports of the roads to the Interstate Commerce Commission, represent roads having approximately 89 per cent of the entire railway mileage of the country and 97 per cent

of the operating revenues. The average receipts per ton mile for all of the roads in the country will slightly exceed the figure for the larger roads, but the complete figures can hardly fail to show an approximately similar reduction. In 1915 the average for all roads was 7.32 mills, which was lower than for any other recent year except 1913, when the average was 7.29 mills. In 1906 the average was 7.48 mills. The decrease is probably to be accounted for by a greater proportion of low rated commodities because there was an increase in the tonnage of products of mines from 507,000,000 in 1915 to 646,000,000 in 1916, while the increase in other classes of tonnage was far less in proportion. This doubtless represents the increased movement of coal. The average wage per employee has, of course, been steadily increasing for several years.

In general, State public service commissions charged with the duty of passing upon the issuance of railroad and public

**Regulation of
Security
Issues**
utility securities, have been careful to point out that approval given to a particular issue did not mean that in the opinion of the commission this was a good investment, but simply that the

provisions of the law in respect thereto had been complied with. Now, however, we have the division of capitalization of the New York Public Service Commission, Second district (all of the State outside New York City) claiming some credit for the salability of public service corporation securities issued with its approval. In the commission's annual report for the year ended December 31, 1916, the division of capitalization says:

The improvement in the market for practically all classes of securities is partly responsible for this [better selling price of securities], but it is believed that these inquiries by the commission into the balance sheet accounts of the corporations under its jurisdiction, which have resulted in a verification of their statements of assets and liabilities, have had a beneficial effect upon the salability of the securities of these corporations.

The *Railway Age Gazette* has many times called attention to the point that with small investors particularly, the fact that a particular issue of securities had been passed upon and approved by a state commission carried considerable weight. The trouble has been that some state commissions were quite incompetent to pass intelligently on the propriety

of the methods of raising new capital adopted by public utility or railroad companies, and even where the personnel of the commission was such as to inspire confidence, the laws under which the commission carried on its duties placed restrictions where no restrictions were required and left loopholes for unsound financing where rigid restrictions should have been required. If it is true, therefore, that the supervision given by an intelligent, high-class commission like that of New York, the Second district, secures better prices for public utility issues, it ought to be true that if the Interstate Commerce Commission, or some division thereof, takes over the supervision of the issuance of securities by all railroads subject to the commission's jurisdiction throughout the United States it ought to help the market for steam railroad securities.

MATERIALS FOR MUCKRAKERS

AN example of the misleading impressions being created by the first tentative valuation reports which have been promulgated by the division of valuation of the Interstate Commerce Commission is afforded by an article in a recent issue of the Century Magazine by George Creel, in which he says: "Only recently the Interstate Commerce Commission reported on the physical valuation of two small roads. It found that one road, capitalized and bonded at about \$99,000,000, could be reproduced for about \$46,000,000 and another capitalized at about \$41,000,000 could be reproduced for less than \$9,000,000. It is the story of every railroad in the United States. What of the reduction in fares and freight rates if every railroad were to figure profits on the real value of the property?"

The first road referred to, of course, is the Kansas City Southern and the second the New Orleans, Texas & Mexico, but the commission by no means found that the roads could be "reproduced" for the figures mentioned. The figure reported by the commission for "cost of reproduction new" does not pretend to include the land used for common carrier purposes, without which a railroad could not operate very successfully, although in a separate column the commission places a present value on this land of \$2,409,000. It does not include materials and supplies, which the commission found having a book value of \$2,700,000, nor does it include working capital or some of the most important terminals of the road, to say nothing of many other elements of value. Even the items which the division of valuation has included, as has already been pointed out in these columns, are based on methods of calculation which the road from its own experience has found to produce absurdly low results; and in the protest which has been filed with the commission by the carrier, which has made a most thorough and painstaking valuation of its own, items on which the commission has calculated the tentative reproduction cost as \$50,000,000 are given a total value of \$89,000,000. Mr. Creel says that the commission has reported on the "physical" valuation, entirely ignoring the fact that the valuation law was amended before its passage for the specific purpose of leaving out the word "physical." The tentative valuation not only does not cover the entire physical value of the road; it does not even include all of the cost of the physical property of the road.

In the case of the New Orleans, Texas & Mexico the total capitalization reported by the commission covers some 900 miles of subsidiary property in Texas, while the cost of reproduction covers only the 172 miles of the parent company in Louisiana, and even the commission's tentative costs will not have an opportunity to catch up with the capitalization until the report has been issued on the Texas lines. Mr. Creel has, of course, made no effort to find out what the commission reported, and possibly he does not know that the reports are only "tentative," but these incomplete tentative valuations are affording some very attractive material to the class of writers that take pleasure in attacking the railroads on the basis of any figures that come to their attention.

RAILWAY MACHINE TOOL EQUIPMENT

THE machine tool equipment of most railway shops will stand no comparison with the equipment of many enterprising industrial concerns. This fact was particularly mentioned by E. W. Pratt, who stated in his presidential address before the Master Mechanics' Association last June that some of the railway shops are 30 to 40 years behind the times in machine tool equipment. There is no logical reason for this condition. If the industrials, and especially the locomotive builders, find it economical to maintain well equipped shops the railroads should also. The trouble is this matter has not been given the consideration it deserves. The poorly equipped shop not only increases the cost of locomotive repairs but also the cost of transportation. Inefficient tools mean that the locomotives will be held out of service for repairs for longer periods than if the work required was done on up-to-date and efficient machines. It means that the work can not be done as carefully and that the locomotives will not be so maintained that they will operate at maximum efficiency. Locomotives held out of service and inefficient power mean delayed shipments or the purchase of additional power. It is apparent that the general officers of many roads do not appreciate the far-reaching effects that the condition of the machine shop equipment has on operating costs, and the opportunities there are for savings to be made in this particular field.

The railways spend over \$50,000,000 for machinists' wages, each year. A saving of only one per cent of this sum would be \$500,000. Estimating interest at 6 per cent and depreciation at 9 per cent, this \$500,000 would annually more than finance an expenditure of over \$3,000,000 for machine tools, which is about one-fourth of the amount spent by all the railroads for shop machinery and tools each year. Such an increase over the present expenditures for machine tools would save a great deal more than one per cent in machinist labor. In addition to this the general condition of the power would be improved and the time it is held out of service for repairs would be reduced. There are large opportunities for savings to be made by more adequate machine tool equipment. Mechanical department officers should avail themselves of every opportunity to impress this fact upon the minds of their superiors, backing up their arguments with definite information as to the results that can be expected from improvements in this field.

PLEASE KNOCK OFF THE CHIP

THE switchmen in the Chicago terminal district belonging to the Brotherhood of Railway Trainmen are a sorely disappointed lot. Well schooled in the fundamental principle of unionism that the time to hit the other fellow is when he can't fight back, the organization put a chip on its shoulder and prayed that it would be knocked off.

On January 31, a strike ballot was prepared which gave as the cause for action four trivial grievances, i. e., the discharge of a switchman on the Atchison, Topeka & Santa Fe for refusing to work with a yard engine with less than a full crew of one foreman and two helpers; the occasional use of road men on Chicago, Burlington & Quincy trains within the Chicago terminal district; the coupling of a caboose to the locomotive instead of to the end of a train on the Chicago, Milwaukee & St. Paul; and the discharge of a New York Central yardman for declining to couple the air hose between the engine and the tender until proper protection was assured as required by the safety rules. The ballot also contained the significant statement that the vote would be used, if necessary, to effect a settlement of *all* matters of difference with the railroads.

The Chicago switching district is at present badly congested on account of embargoes by eastern roads and the slowing up of operation by a protracted period of severe weather. A strike which would stop the wheels on 18 lines would prove

particularly serious at a time when a cessation of transportation would mean an intolerable shortage of the city's fuel and food supply and when strained foreign relations indicating a possibility of our entrance into the war. In other words, the men believed that if a plausible pretext for walking out could be found, they would have sufficient leverage not only to effect a settlement of the specified points at issue but *all* matters of difference.

Exactly what differences they have in mind have not been made public. It is a matter of common knowledge, however, that the B. of R. T. was one of the organizations which forced the passage of the Adamson law. This act, however, may be declared unconstitutional by the Supreme Court, and pending a decision the brotherhood can hardly strike to gain demands already granted by the law. Yet how convenient it would be to achieve the desired ends incidentally through a strike called on other grounds—especially in the event of a holding by the court unfavorable to the unions. Once on a strike—no matter what the original points of dispute—the switchmen could ask whatever they chose as the terms of peace. These calculations, or whatever others may have been entertained, were not realized, because the railroad managers, in their meeting with the union representatives on February 8, wisely chose to remove specific causes for complaint without arguing their merits. The two employees discharged were reinstated and given back pay. In passing, it might be mentioned that these latter two cases had not been previously referred by the union to the general managers of the two roads involved, as required by the joint agreement.

PRELIMINARY STEPS IN THE REORGANIZATION OF THE MISSOURI, KANSAS & TEXAS

QUITE a number of the reorganizations of railroad companies that were put through in 1895-98 were successful, principally because of the rapid development of the country which these roads serve and the fact that the resulting growth of traffic to the railroads permitted the fuller use of facilities already provided. In other words, what had brought about many of the receiverships of 1893-94 was the overprovision of facilities, although the immediate cause of the receiverships was the financial panic and following depression. The reorganizations, many of them under the auspices of J. P. Morgan & Co., were, in most cases, very far from drastic. Everybody's interests were preserved as far as was possible, even if this necessitated little or no reduction in fixed charges. The outlook for the railroads which are being reorganized now is altogether different. While it is true that increased traffic would be of the greatest possible value to a road like the Missouri, Kansas & Texas, the only prospect of securing this increased traffic and of handling it economically lies in gradually adding to the facilities on a considerable scale. This would mean not only the provision of a certain amount of cash for reorganization purposes and for the immediately needed improvements, but the provision of a sound, economical means of future financing.

The report on the Katy, which was recently made by Coverdale & Colpitts, consulting engineers, for the bankers—Hallgarten & Co. and J. & W. Seligman & Co.—who are working on plans for reorganization, is a new departure. It gives a method of approach to a reorganization plan, which is quite different from anything that was attempted in the reorganizations of 1895-98. It is peculiarly applicable to a southwestern railroad system. The Missouri, Kansas & Texas and other southwestern systems have been put together piece by piece, and in the Missouri, Kansas & Texas case the financing of this process was rather glaringly piecemeal work.

The report of Coverdale & Colpitts to the bankers reverses this process. Taking as a basis from which to start the lines covered by the first and second mortgages and certain lines included on a rental basis and trackage rights basis, a study

is made of each of the other lines so as to determine, first, its value to the system, and second, its probable earnings if operated separately. A mileage prorate basis of revenues and expenses is not used; each case is determined on its merits; that is, an estimate is made of what would probably be the division of rates if the line under consideration were to be operated by an independent company.

The report is a comprehensive scientific valuation in terms of earning power of each of the mortgage lines of the system. As an appendix to the report there is a division of earnings and expenses on a mileage prorate basis for each one of the mortgage lines, but the engineers do not consider this a proper basis for determining values and it is safe to say that almost any one who will make a careful study of the report and who has a practical knowledge of railroad rates and statistics of operation will agree with the engineers.

The method of determining the valuation which the engineers put on each one of the mortgage lines was to go back over all of the waybills of the entire system for three years and to determine for each line, the revenue from each shipment, whether the shipment originated on the line, was destined to a point on the line, or both, or simply passed over the line. The value of the local traffic of a particular line and the extent to which the line contributed revenue to the balance of the system or merely served for passover movements was, therefore, accurately ascertained, and in determining the value of the line it was accorded the full divisions of rates current in the territory on all traffic that was interchanged with the balance of the system, it being assumed that these divisions would be allowed the line if it were segregated from the system and independently operated. Against the loss of gross revenue that the system would suffer if the line were detached was placed the estimated reduction in system operating and other expenses. The difference represented the net value of the line to the system expressed in net revenue contributed by it toward the payment of interest charges.

There was an immense amount of work involved in the compilation of this report, but the various reorganization committees now have real solid ground on which to stand. There will be, of course, the usual trading and manoeuvering for position of various classes of security holders as in any reorganization plan, but for the first time, probably, in the history of a large American railroad reorganization there is a real scientific groundwork for negotiations as between different classes of bonds.

Such a report as this ought to be of the very greatest value to the organization committees of the Missouri, Kansas & Texas because of the unusually complicated system of mortgages on the property. There are in all 42 bond and note issues. A part of line like the Missouri, Kansas & Eastern—the line along the northern bank of the Missouri river which connects the Katy main lines with its trackage rights entrance into St. Louis—is covered by five mortgages, and yet not only would the line show a deficit if operated independently, but, taking into consideration the interest charges on its prior liens as well as all of the benefits, direct and indirect, which accrue to the system through the operation of this line, it would save money for the rest of the Missouri, Kansas & Texas if trackage rights were secured and this line abandoned.

It has been pointed out in the *Railway Age Gazette* many times in recent years that an absolute first lien on a piece of railroad was valuable only to the extent that the earning power of that piece of road was sufficient to pay the interest charges on the first mortgage bonds. Probably some of the holders of bonds which are secured by an absolute first lien on some of the lines of the Missouri, Kansas & Texas will put up a stiff opposition to accepting a plan of reorganization which will force them to take, in whole or in part, stock in exchange for their bonds. Nevertheless, unless they can show that the Coverdale & Colpitts report is unsound they will have to acknowledge the inherent justice of such a reorganization plan.

Letters to the Editor

PRIVATE OFFICES FOR THE TRAIN DESPATCHERS

LITTLE ROCK, Ark.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

There has been considerable discussion of various phases of train despatching in the *Railway Age Gazette* of late, but as yet I have read nothing dealing with the actual working conditions of the despatcher. Instead of having the despatcher's office open to trainmen, roadmasters, and any other railway men that may wish to enter, I believe the trick man should be placed in a private room where he would not be disturbed. It is my opinion that every mistake that has been made by an experienced despatcher may be traced to unfit working surroundings. To handle trains satisfactorily the despatcher's mind must be on his trains. How can he be expected to do his work efficiently with railroad men in the office criticizing some one or gossiping, or the chief despatcher talking on one telephone while another is ringing? Yet these are ordinary incidents of his daily routine.

DESPATCHER.

THE WIDE FIREBOX

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The communication of George L. Fowler, appearing in your issue of February 2, as to the question of priority of invention between James Milholland and Theodore N. Ely, for what Mr. Fowler defines as being "*the placing of the firebox on top of the frames instead of between them*," squarely admits, in its opening paragraph, the correctness of my claim of the originality of Mr. Milholland in the design above quoted, by the statement that "He is [referring to me] correct so far as the mere location is concerned." By a remarkable exercise of mental acrobatics, Mr. Fowler, however, attempts to make this admission meaningless, and to lay the foundation for an argument in support of a claim of originality for Mr. Ely, by his statement, in the next sentence: "But this is not the whole story."

With entire respect to the reverential, though exaggerated, laudation of Mr. Ely, which characterizes the communication of Mr. Fowler, but with equal respect for the plain meaning of the English language, and for the most elementary knowledge of locomotive construction, I maintain and insist that where, as in this case, a design consists in, and is defined as, "placing the firebox on top of the frames instead of between them," the "mere location" is the "whole story." There is no other story to tell which is relevant to the question of originality, and whether this "mere location" which was put into practice by Mr. Milholland in 1857, and by Mr. Ely in 1881, was made upon a smaller engine in the original design of 1857, and on a larger one in the duplication of it in 1881, the *design itself* is identical in the two cases.

If "placing the firebox on top of the frames" is, as stated by Mr. Fowler in the paragraph next preceding his last, "but an incidental feature," in a design which consists, as stated in his first paragraph, in "the placing of the firebox on top of the frames instead of between them," an explanation from Mr. Fowler of what the *essential* feature of the design consists in, would be both interesting and instructive.

Mr. Fowler's statements as to the criticisms and predictions that were made of and upon Mr. Ely's adoption of the Milholland design, and his showing of the self-evident fact that the Milholland locomotive of 1857 was naturally *smaller* than the Ely locomotive of 1881, have no bearing whatever

on the question of the *originality* of the design of placing the fire-box on top of the frames, and no one who is, or was, familiar with the conditions of locomotive construction and operation in the years named, would be warranted in calling Milholland's "Vera Cruz," which was for years in regular passenger train service on the Philadelphia & Reading, a "toy," even when compared with its enlarged prototype, the Pennsylvania Class K of 1881.

While a comparison of the dimensions of the Milholland and Ely locomotives is manifestly irrelevant to the question of *originality*, it may be noted that the illustration of the Class K engine in *Recent Locomotives*, 1883, indicates the depth of firebox to be, approximately, 11 in. below the rear waist sheet of the boiler, and that of the Milholland engine, as shown in Plate 53 of Holley's *American and European Railway Practice*, 1861, is approximately, 16 in. The "shallow" firebox of the Milholland engine was, therefore, as a matter of fact, *deeper*, instead of shallower, than that of the Class K; the firebox was not "widened" to any substantial extent either by Mr. Milholland or Mr. Ely, and was *widened* as much by the former as by the latter, *i.e.*, only by the width of the frame rails.

I again assert that, as a matter of fact within my personal knowledge, it was James Milholland and *not* Theodore N. Ely, who first did precisely what you have defined in somewhat florid terms, in your articles of July 7, 1911, and November 3, 1916, as "lifted his whole boiler into the air, set his foundation ring on top of the frames, widened his firebox, and gave the machine a new lease of life."

An "expert witness," promoting a claim of originality on behalf of Mr. Ely, would doubtless be able to discover that the application of the design above defined was originally "accomplished" by Mr. Ely in 1881, and not by Mr. Milholland in 1857, upon the basis that Mr. Ely "accomplished" it in a *larger* locomotive than that of Mr. Milholland. I am, however, confident that a competent and impartial engineer, who compares the illustrations of the design which Mr. Milholland put into actual and successful practice in 1857, as illustrated in Holley's *American and European Railway Practice*, 1861, plate 53, and in *The Engineer*, London, Feb. 8, 1861, page 90, with the same design in Mr. Ely's Class K engine of 1881, as illustrated in *Recent Locomotives*, 1883, figs. 22-42, would base his judgment as to originality on facts and dates, and not on *dimensions*, in which case he would, as Mr. Fowler has done in the first paragraph of his communication, necessarily admit the correctness of my statement that the design was originated by James Milholland in 1857.

J. SNOWDEN BELL.

NEW BOOKS

Pipe and the Public Welfare. By R. C. McWane. 165 pages, illustrated, 7½ in. by 5 in. Bound in cloth. Published by the Sterling Press, 318 West Thirty-ninth street, New York. Price \$1.

This book deals with the history, manufacture and durability of water pipe with particular reference to pipe made of cast iron. The historical section reviews briefly the history of the water supplies of London, Philadelphia, New York and Boston and touches on the earliest installations of cast iron water pipe in France, near Paris. The book also contains an explanation of the manufacture of cast iron, wrought iron and steel pipe. The corrosion of metal pipes occupies the larger portion of the book and includes an exposition of the author's theory for the demonstrated greater durability of cast iron as compared to wrought iron or steel, and much data on the life of pipe made of these materials as secured from the records of actual installations of long duration here and abroad.

The last chapter of the book is devoted to experience with wood pipe of both the primitive bored log type and the more recent wood stave pipe.



Tug of War Contest; Pennsylvania Athletic Meet at Altoona, Pa.

Dangers to Be Avoided in System Athletics

Remarkable Possibilities in Such a Program, But Conditions Must Be Right and Details Carefully Planned

WHILE it is the custom on many roads to have occasional get-together meetings or picnics on certain divisions or sections, at which athletic sports in some form or other are a part of the program, the practice is not by any means a general one. Two large roads, however, now hold annual system track and field meets. The Pennsylvania Railroad (lines east) held its second annual track meet at Altoona, Pa., on Saturday, September 30, 1916, and the Missouri, Kansas & Texas held its second annual system meet at Parsons, Kan., October 6-7. The Erie Railroad held a three-day celebration at Huntington, Ind., August 22-24, at which time shop fire department contests, a band contest, a pistol competition and baseball games were held. The second annual track and field meet of the Erie Railroad Athletic Association was held in Jersey City, N. J., Saturday afternoon, September 16.

Railroad officers who have been interested in cultivating a family spirit or esprit de corps among the officers and employees of their respective roads—and there are not a few of them—have been attracted by the possibilities of such meets. The address by C. G. Elliott, assistant to the chief operating officer of the Missouri, Kansas & Texas, on "How a Great Corporation Got 5,000 to Play," which was made at a Lake Geneva (Wis.) week-end conference on "New Ideals in Industrial Betterment," and was published in the *Railway Age Gazette* of July 28, 1916, also started many to thinking along these lines.

There can be no question but what the system field meets have been helpful in getting the Katy men closer together, and this is undoubtedly true also of the other roads which have held such programs. It would be foolish, however, to advance extravagant claims in this direction for system athletic meets, this enterprise is one among many things which may contribute toward this end. The personnel of the official staff and the attitude of the officers toward the men—the spirit of the management, in other words—is after all the most vital factor, and system or division athletic field meets and their success are only one of the surface indications of this attitude. The athletic program, if properly carried out, will do much to improve the physical, and therefore mental and social development of those who participate, and will be helpful in promoting a better feeling and closer relationship

between the employees on the different parts of the system and between the officers and the men.

DANGERS IN SYSTEM ATHLETICS

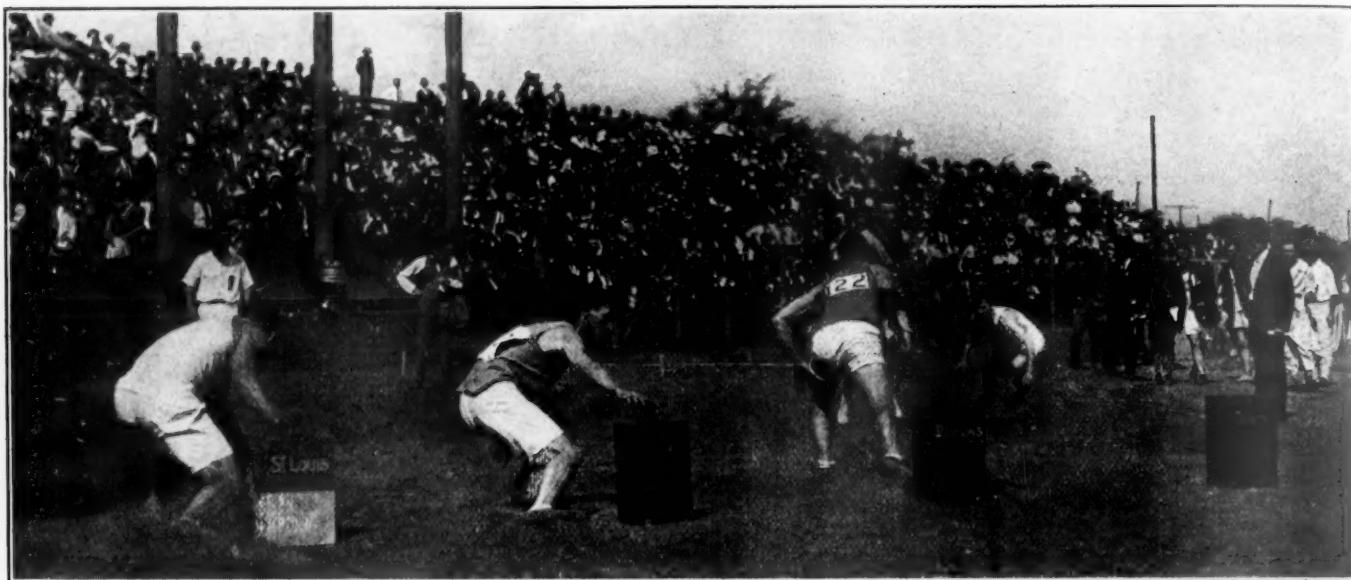
Given a group of officers who are not warmly and intelligently interested in the men under them, and who do not understand the importance of promoting team work and the vital necessity of building up an esprit de corps in a big organization, and the promotion of athletics and field meets will probably not be worth the money and energy expended to carry them out. The statement has been made many times in these days of great industrial corporations and railway systems that the officers and men are too far apart and do not understand each other. This is all too true, and the opinions held by the humblest workmen are usually a fairly good barometer of the broadness or the smallness of the management which directs the welfare of the railway. If the spirit of the management is not right, there are far more important things than the promotion of system athletics which demand immediate consideration. Assuming that the right kind of men are directing the organization, and granting the truth and force of Mr. Elliott's arguments for system athletics, as set forth in the above mentioned address, more harm than good can be accomplished if certain fundamental principles are not recognized and followed in promoting the athletic program.

Three things must be guarded against: (1) Physical harm to contestants because of ignorance and lack of direction of training by experts; (2) the possibility of becoming too greatly absorbed in athletics; (3) the great danger which must be guarded against in all amateur athletics—professionalism. Physical directors should be provided to examine and rule out those whose physical condition is such that they should not train or compete, and to outline and supervise the training, and guard against those serious dangers which follow both over or under-training. This service may be performed in many cases and under excellent conditions by physical directors of railroad Y. M. C. A.'s, or of city Y. M. C. A. associations, if no railroad association is available. The Missouri, Kansas & Texas has utilized these agencies to splendid advantage, including the services of Dr. W. H. Ball of the physical department of the International Com-

mittee of the Y. M. C. A. It is positively dangerous to promote system athletics without adequate expert guidance in these matters.

Too great absorption in athletics and professionalism can only be guarded against by the most painstaking and careful efforts on the part not only of the leaders, but of all those in

clean and healthful athletics should be so pronounced among the men in all departments that it would not be necessary for those at the head of the sports to use a microscope to guard against the evil. This spirit should be so strong that the local athletic manager will see to it that the record of his team is untainted. It will require thought and skill and



Potato Race, Missouri, Kansas & Texas Field Meet at Parsons, Kan.

authority. For these reasons it is not wise to pay men for time used in training or competing. The danger also of having a local or division officer hire or retain a man on his staff because of physical prowess, rather than for his ability as a workman, and of extending special favors or courtesies to athletes, can readily be recognized. The officers should take

energy and much planning to bring about so desirable a condition—but it must be done if real success is to be assured.

OTHER REQUIREMENTS

An athletic or field meet to be a real success, either in the minds of the participants or with the spectators, must be run



Part of Street Parade, Pennsylvania Field Meet at Altoona

a keen interest in the physical records made by their men, and should root for them, but should guard zealously against favoritism.

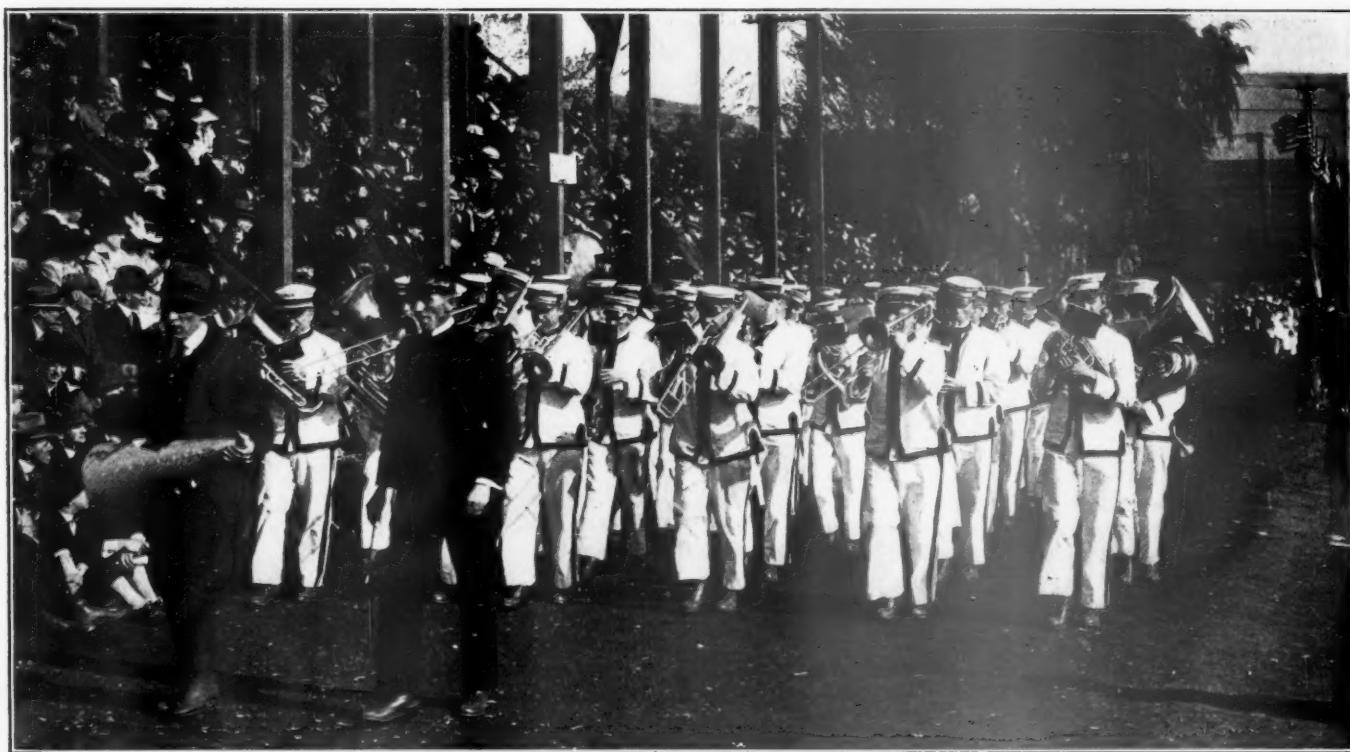
So far as professionalism is concerned, the enthusiasm for

off on schedule time and without dragging. Spectators must be kept under control and there must be no causes for friction or argument. To accomplish this successfully means that critical attention must be given to a thousand and one de-

tails, and the efficient organization of a staff of helpers, as large as, and possibly even larger, than the number of athletes engaged. Because the duties of these helpers are often exacting and tedious, although exceedingly important, is all the more reason why the work must be scientifically planned to the last detail—and the members of the staff must be made to feel the necessity of letting nothing interfere with the carrying out of their assignments. A strong executive is required to head the movement and he must have the co-operation and help of a group of men of executive ability. Indeed, not the least important result of these system meets has been the development and discovery of executive ability where it had not been expected. The spectator at the meets is interested in the various competitions, and usually fails to recognize that to plan and carry out a successful program requires ability on the part of not one, but many men, which is of an entirely different order from that possessed by the contestants, and yet is of even more importance than that which makes an athletic winner. This is especially true where several divi-

were inspired to give greater attention to their physical welfare, because of the examples of these men. For instance, the activity of one railroad in promoting athletics was the means of stirring up a town of 20,000 to raise a fund to enlarge the Y. M. C. A. building, which was used jointly for city and railroad purposes. A physical director was employed; shortly afterward one of the railroad officers noticed that two young men who had used cigarettes freely had stopped smoking. They did not pretend to be athletes in training, but said that they were impressed with the statements of the physical director concerning the harmful effects of tobacco. Incidents of this kind are not infrequent and speak for themselves.

Said another railroad officer in speaking of system athletics: "The whole business doesn't appeal to me. It does nothing for the older men, who are deserving of favors, and helps only the young men." As a side light it is perhaps important to know that this statement was made while the officer in question was hard at work cleaning up his desk,



One of the Bands Parading on the Running Track; Pennsylvania Field Meet at Altoona

sions, extending over a number of states and including thousands of miles of railway, are concerned.

A COUPLE OF CRITICISMS

One officer in commenting on a system field meet said: "No expenditure for this purpose would be too great if it insured the development of a big family spirit on the part of our men. I don't think a great deal of the actual physical benefit to the comparatively few men who participate."

Let us stop for a moment and analyze the latter part of this statement. Assume that there are six divisions on the system and that at least two or three points on each division have baseball teams to compete for the division championships. There might easily be 20 or 30 teams on the entire system, involving in all several hundred players. In like manner it would be fair to multiply by at least 15 or 20 the number of men who actually participate in a system field meet to get a fair approximation of the number who seriously started out with the intention of taking part in it.

It would be impossible to estimate the number of men who

although the meet was in progress less than half a mile away; also that thousands of men—many of them about as old as Grand Army veterans—were forming for a great parade through the streets of the city. Moreover, old men, as well as girls and women, enthusiastically cheered and rooted throughout the day for their representatives in the races and the baseball game.

The comment, however, opens up a field of discussion on which we can only touch at this time. Few, if any, roads have done more for their old men than the one whose officer made this comment. A management which takes good care of those who have given the greater part of their lives in its service should in all consistency do something for its young men—and where could a better investment be made? Our railroads have done little or nothing to prepare their men for the future. Physical and mental development should go hand in hand. No reasonable man will deny the stern necessity for preparing bigger and better men for the work of the future. If a modest athletic program will help to attract and hold young men on the railroads or will instil in them cleaner and

higher ideals, while at the same time developing them physically, it will be well worth the expenditure of such energy and money as may be necessary.

CLEAN ATHLETICS

The athletic program may be regarded as a failure if it does not result in a healthy spirit of rivalry, the contestants fighting to the very limit of their strength to win, but fair-minded and cheerful, if losers. Observations at the system field meets referred to above indicated a most delightful state of affairs in this respect. Mingling among the players, contestants and spectators after the games was a distinct pleasure because of the absence of criticism and fault finding which often follows contests of this kind.

The baseball games—system championship games at the end of the season—were remarkably clean and well played with practically no squabbling or umpire baiting. While the presence and rooting of the higher officers and large numbers of women and children may have had some effect, it is doubtful if under the exciting conditions, the teams could have behaved so well had they not held themselves well in hand throughout the season. In all cases the spectators formed a most good-natured and happy crowd, with many women and children in evidence—and in true American fashion the ladies did their full share of the rooting, and particularly so at the Katy meet.

There was not a uniformed policeman on the grounds at the Katy meet at Parsons. In the first place, the few policemen required in Parsons for ordinary occasions are not dignified with uniforms; in the second place, they were not needed. Order was maintained by so-called marshals. These, in all cases, were officers of the railroad and were distinguished by a peculiar shaped hat, a badge and a baton. In a smiling, good-natured way they kept the spectators off the field and within proper limits. It is doubtful if twice as many uniformed officers could have done as well—and handling 12,000 or 15,000 people, probably the largest crowd ever assembled in Parsons, may be regarded as no easy task. The crowd was truly responsive to the spirit of the marshals.

The delightful way in which the townspeople in the town where the meets are held join in and co-operate is an item of no small importance in these days, when the relations between the railways and the public are so greatly in need of readjustment.

SYSTEM FIELD MEETS

A brief description of the various system athletic meets may be suggestive and of value to those who have an athletic program under consideration. Each system must, of course, experiment to find out what events will prove of greatest interest to its employees and how best to arrange the program.

The Pennsylvania Railroad meet was held on the cricket field at Altoona, Pa. It was estimated that 8,000 or 10,000 visitors came on regular and special trains. These, added to the 15,000 railroad men in Altoona and the townspeople who participated, made a crowd of no small proportions. Beginning at 9 a. m. the trapshooting contest was held at the South Altoona foundries, and the rifle shooting contests at the machine shop range. At the same time the volley ball contests were held at the cricket field and the tennis trials were started at the same place. From 10 a. m. to 11:40 trials were held for track and field events and the high jump was decided. At 11:45 a. m. the employees paraded through the city with 14 bands. In the early afternoon the tennis finals were played, and the final track and field events were held, including the 100-yd. dash, 880-yd. run, broad jump, 220-yd. dash, shot put, tug-of-war, mile run and mile relay. At 3:15 the Altoona car shop baseball team, champions of the Western League, played the Philadelphia Terminal (M. P.), champions of the Eastern League, for the system championship and the W. W. Atterbury cup. The former team won by a score of 2 to 1, after a game as exciting as one of the world's

series. Trophies were presented late in the afternoon by Vice-President Atterbury and General Manager S. C. Long. The meet was in charge of a committee, of which John T. Coleman, director of the Pennsylvania Y. M. C. A. at Philadelphia, was chairman. Each division has its own athletic association with well equipped grounds and club houses.

The Missouri, Kansas & Texas meet at Parsons, Kan., on October 7 was equally as enthusiastic as the Pennsylvania meet, although some of the visitors traveled as many as 18 to 24 hours to be present. On Friday, the 6th, the trap shooting and tennis tournaments were started and the trial heats were run in some of the events.

Saturday was a gala day. The sixteen specials came in early and the entire station was converted into a big dining room. The preliminary events were held during the morning. Three shop teams also competed in a fire drill tournament. Box lunches were served on the athletic field at noon through the courtesy of the citizens of Parsons, and immediately after lunch baseball teams from Smithville, Tex., and Sedalia, Mo., competed for the system championship, the latter team



General Superintendent G. W. Creighton Holding the W. W. Atterbury Cup Which Was Won by the Altoona Car Shops Baseball Team

winning by a score of 7 to 6. The occasion was enlivened by several shop bands.

The following events were then decided: Tug-of-war, 100-yd. dash, pole vault, finals in quoits tournament, 200-yd. dash, 12-lb. shot put, boys' 75-yd. race, running broad jump, fat men's race (50-yd.), running high jump, girls' 50-yd. race, 440-yd. dash, 50-yd. sack race, half-mile run, 120-yd. low hurdle, running hop-step and jump, obstacle race, girls' potato race, one-mile run, men's potato race and relay race.

Parsons athletes won the greatest number of points, 43, with St. Louis a close second, 42. A Mardi Gras carnival was held during the evening and the trophies were also presented to the winners by C. G. Elliott, who acted as general chairman of the meet. All of the special trains had departed by midnight.

The Erie celebration at Huntington, Ind., lasted three days and included two baseball games, shop fire department contests in which 18 teams participated, a pistol competition for the members of the Erie police department, a contest between eight Erie bands and a big street parade. The visitors lived in tents at Camp Mackrell on the fair grounds.

The Erie Railroad Athletic Association, which held its

second annual field meet at Jersey City, September 16, is composed largely of employees in New York and Jersey City, although any employee of the Erie Railroad is eligible. The association has recently opened club rooms in New York, having three floors equipped with bowling alleys, pool and billiard tables, basket and hand ball courts, gymnasium, shower baths, etc. There are 16 baseball teams on the Erie, organized into two leagues, eight teams on the east end and eight on the west end of the system. In 1915 an Erie employees' athletic year book was published. It contained 90 pages and was copiously illustrated, covering all of the athletic activities on the entire system.

WASHINGTON CORRESPONDENCE

WASHINGTON, D. C., February 13, 1917.

LABOR BILLS IN CONGRESS

Objections by Samuel Gompers and the officers of the four railway train service brotherhoods to the proposals for a law to prevent strikes pending a governmental investigation have had more weight with the members of the Senate and House committees on interstate commerce than the recommendations of President Wilson, the expressions of commercial and civic organizations and the silent prayers of the railroad officers. The labor leaders opposed with all the eloquence at their command the bills designed to carry out the program announced by the President at the time of the passage of the Adamson law, on the ground that to suspend the power to strike even for four months would constitute "involuntary servitude" and otherwise destroy the inalienable rights of free citizens. As a result, the various bills to postpone or prevent strikes have been killed in committee and the bills now pending in both the Senate and the House provide merely for an investigation and report by the United States Board of Mediation and Conciliation assisted by representatives of the railways and of the employees, without power to enforce its findings.

As the labor leaders were the only witnesses at the public hearings before the House committee and the principal witnesses before the Senate committee, it is perhaps not surprising that their views should have had some effect. Although many of the committee members themselves indicated by their questions that they felt that the public ought to have some protection against strikes, the public had very little representation at the hearings and the railroads took no part in the proceedings at all. Of the 536 pages of the printed reports of the committee hearings, about 100 are taken up with the testimony and questioning of the representatives of the great third party whose interest in labor disputes is said to be paramount, while most of the remainder was taken up with the statements of the labor leaders and the questions asked of them. The labor leaders also took the precaution to see that their 400 pages followed uncontradicted the statements made by representatives of the civic and commercial associations.

The labor leaders told Congress that some one had fumbled when Congress tried to use the eight-hour demand as a political football last summer and that hereafter they would prefer to have Congress keep its hands off. If Congress felt it necessary to enact some labor legislation they proposed a commission composed of two railroad officials and two brotherhood members to make investigations and reports and Representative Keating has introduced a bill providing for such a commission to supersede the present United States Board of Mediation and Conciliation.

Inasmuch as there can be no decision by the Supreme Court on the constitutionality of the Adamson law before Congress adjourns, an effort may be made during the debate on the bills to insert a more drastic provision against the emergency which may arise if the brotherhoods renew their strike threats. On the other hand there will probably be some

opposition to the prohibitions against interference with trains, which are included in both the House and Senate bills, but it appears by no means certain that Congress will take any action at all.

The Senate Committee on Interstate Commerce on February 10 reported favorably the bill, S. 8201, introduced by Senator Newlands on the previous day, which represents the committee's view of the extent to which Congress should go in carrying out the recommendations made by President Wilson for legislation to supplement the Adamson eight-hour law by providing for a governmental investigation of controversies between railroads and their employees. The bill is very similar in its terms to the bill reported earlier in the week by the House committee, which was discussed in last week's issue. Like the House bill, it does not include the provision for making strikes illegal pending an investigation, but provides that whenever a controversy cannot be settled through mediation and conciliation or by arbitration, the President shall add to the board of mediation and conciliation one representative of the employees and one representative of railroad officials, to investigate the controversy and submit a recommendation within three months. The House bill provides for two representatives of employees and two of railroad officers. The second section of the Senate bill, prohibiting the obstruction of interstate commerce or the United States mails, differs from that in the House bill by omitting the provision authorizing the President to employ the armed forces of the United States to prevent obstruction of the mails or of interstate commerce, but it contains a provision not in the House bill, that any person who, after having in concert with another or others refused to work in his usual employment with, or left the service of a common carrier, shall trespass upon its premises or any of its properties for any of the purposes prohibited by this section, shall be deemed guilty of a misdemeanor and punishable by a fine of not exceeding \$100 or by imprisonment for not exceeding six months or both.

Sections 3, 4, 5, 6 and 7 of the bill correspond to similar sections in the House bill, to authorize the President to take possession of railroads and telephone and telegraph lines in case of actual or threatened war, insurrection or invasion or any emergency requiring the transportation of troops, military equipment and supplies.

Senator Newlands presented a verbal report on the bill, saying that it was intended to carry out the recommendations made by the President, but that the committee had concluded not to interfere with or to suspend the right to strike or lockout during the period of investigation because the power of strike was the only weapon which labor has thus far had for the determination of disputes with their employers, but that it was the expectation of the committee that the disputants would halt their proceedings during the period of investigation and that the report of the investigating board would be influential in securing a sound public opinion and thus by its own moral force secure industrial peace. Senator Newlands said that he did not concur in the view of the majority of the committee in omitting the suspension of the right to strike and that he presumed an opportunity would be given to vote upon that question in the Senate. He announced his intention of pressing immediate consideration of the bill, together with that passed by the House at the last session, to increase the membership of the Interstate Commerce Commission, which has been favorably reported by the Senate committee and which the President also urged in his messages.

AERIAL NAVIGATION IN FRANCE.—According to press despatches, M. Clement, formerly Minister of Commerce, has formed a committee to study the use of aviation after the present war, especially for national and international postal service.

RAILWAY RETURNS FOR FISCAL YEAR 1916

The Bureau of Railway Economics has issued a bulletin giving a summary of the principal railway statistics of Class I roads, those having gross earnings of over \$1,000,000 for the fiscal year ending June 30, 1916. This is the second in a series of publications for the purpose of presenting as soon as possible after the close of the fiscal year the significant statistics of the more important railway systems of the United States, compiled from their annual reports to the Interstate Commerce Commission. The Class I roads include approximately 89 per cent of the entire railway mileage of the country and 97 per cent of the operating revenues. Emphasis is laid in the introduction to the bulletin upon the fact that these figures are in no sense final; they are preliminary and tentative. They are in some cases liable to correction and adjustment before they receive their final official approval, and comparisons with the preceding year are attempted in only a few cases. No account is taken of intercorporate duplications arising out of the relations between the operating roads of Class I and the smaller operating roads and non-operating companies. The figures are issued in response to a widespread desire for early information as to the results of the fiscal year, and it is believed that they are of sufficient value in themselves to warrant the preliminary tabulation.

An average operated mileage of 230,539 miles of line is represented in the statistics. The income account, with comparisons for the previous year is as follows:

Item.	Amount 1916.	Amount 1915.	Increase 1916 over 1915.
Railway operating revenues....	\$3,381,945,764	\$2,875,431,074	\$506,514,690
Railway operating expenses....	2,211,071,443	2,023,976,522	187,094,921
Net operating revenue....	1,170,874,321	851,454,552	319,419,769
Railway tax accruals.....	145,536,535	133,477,554	12,058,981
Uncollectible railway revenues.	806,749	650,158	156,591
Railway operating income	1,024,531,037	717,326,840	307,204,197
Miscellaneous operating income	1,809,034	1,871,676	*62,642
Total operating income..	1,026,340,071	719,198,516	307,141,555
Non-operating income	245,712,743	236,134,359	9,578,384
Gross income	1,272,052,814	955,332,875	316,719,939
Deductions from gross income:			
Interest on funded debt....	398,174,653	390,964,814	7,210,339
Interest on unfunded debt...	15,746,203	24,228,728	*8,482,525
All other deductions.....	256,623,560	226,638,724	29,984,836
Total deductions	670,544,416	641,831,766	28,712,650
Net income	601,508,398	313,501,109	288,007,289
Disposition of net income:			
Dividend appropriations	184,088,714	169,494,467	14,594,247
Income appropriated for investment in physical property	50,920,596	20,804,968	30,115,628
Other income appropriations.	29,027,395	12,975,507	16,051,888
Total appropriations of income	264,036,705	203,274,942	60,761,763
Balance to credit of profit and loss	337,471,693	110,226,167	227,245,526

* Decrease.

The total capital securities of these roads amounted to \$16,239,589,727, and the total investment in road and equipment to \$13,956,151,783. Both of these figures are affected by duplications resulting from intercorporate relations. The increase in investment during the year was \$331,109,748, as compared with \$1,168,919,714 in the previous year. Of the new investment \$84,864,173 was for new lines and extensions, \$236,049,931 for additions and betterments on new lines, and \$10,195,644 for additions and betterments on leased lines. The total equipment in service on June 30 included 60,788 steam locomotives, 300 other locomotives, 2,264,233 freight train cars, 51,671 passenger train cars and \$94,035 company service cars. Of the freight cars 537,398 were of steel construction and 730,414 of steel underframe construction. Of the passenger cars 11,471 were of steel and 4,572 of steel underframe construction.

The number of general and division officers was 17,057 and their total compensation for the year was \$51,487,894, an average of \$3,018. The total number of employees, excluding officers, was 1,563,928, and their total compensation was \$1,314,665,664. This is an average of \$840.62. For the eastern district the average was \$872.07; for the southern district it was \$732.15, and for the western district it was \$850.57. For 215,000 miles of railroad statistics are given for trainmen paid on a mileage basis, showing the number of hours on duty, the miles actually run and the total compen-

sation. The average compensation per hour on duty for the United States was 47.54 cents, for the eastern district 43.83 cents, for the southern district 48.48 cents and for the western district 53.21 cents. The average compensation per mile actually run was: for the United States 4.17 cents, for the eastern district 4.11 cents, for the southern district 3.87 cents and for the western district 4.38 cents. Some of the principal comparative statistics included in the bulletin are shown in the following table:

Item.	1916.	1915.	Increase 1916 over 1915, per cent.
CAPITAL SECURITIES—Outstanding June 30:			
Stock	\$6,959,678,102	\$6,849,837,346	1.60
Funded debt	9,279,911,625	9,358,903,217	*0.84
Total capital securities....	16,239,589,727	16,208,740,563	0.19
TOTAL INVESTMENT IN ROAD AND EQUIPMENT TO JUNE 30.			
\$13,956,151,783	\$13,620,432,859		2.46
TRAFFIC AND MILEAGE:			
Total revenue train-miles ..	1,193,915,334	1,127,999,218	5.84
Total revenue locomotive-miles ..	1,659,997,875	1,526,001,519	8.78
Total revenue car-miles....	25,996,683,451	23,249,764,182	11.81
Ton-miles of revenue freight carried	339,883,189,699	274,241,010,725	23.94
Revenue passenger-miles ..	33,782,917,382	31,826,876,293	6.15
AVERAGES PER MILE OF LINE:			
Operating revenues	\$14,669.69	\$12,545.57	16.93
Operating expenses	9,590.85	8,830.66	8.61
Net operating revenue	5,078.84	3,714.91	36.72
Taxes	631.29	582.37	8.40
Operating income	4,444.06	3,129.71	42.00
AVERAGE PER FREIGHT TRAIN-MILE:			
Total freight car-miles (cars per train)	37	36	2.78
Revenue ton-miles (tons per train)	545	483	12.84
AVERAGES PER FREIGHT CAR-MILE:			
Revenue ton-miles (tons per loaded car)	22	21	4.76
Revenue ton-miles (tons per car)	15	14	7.14
MISCELLANEOUS AVERAGES AND RATIOS:			
Operating ratio—per cent	65.38	70.39	*7.12
Average receipts per ton-mile—cents707	.722	*2.08
Average receipts per passenger-mile—cents	1,995	1,980	0.76

* Decrease.

THE ASSOCIATION OF RAILROAD SUPERINTENDENTS

At a meeting of the executive committee of the American Association of Railroad Superintendents held recently, the subjects for investigation by the different committees of this association and for report at the next annual convention to be held in Minneapolis on August 8-10 inclusive were determined upon. These subjects have since been assigned to the committees and they are now beginning work upon them. It is the practice of this association to assign several subjects to each of the different standing committees.

Among the subjects assigned for the next year are the following:

- The sacking of grain.
- How to bring about a better feeling between yard, train and engine men.
- Fraudulent service letters.
- The proper method of working under the new Per Diem rules 14 and 15.
- The method of handling home route cars.
- The conservation of equipment.
- The prevention of claims for loss and damage to freight, the proper method of keeping employees advised of the amounts paid for losses for which they may be responsible and methods of securing their co-operation in the reduction of these claims.
- The collection of Per Diem from non-subscriber connections.
- Agency supervision.
- Robberies from private cars in transit.
- Increasing the permissible loading of cars above the marked capacity from 10 per cent to 12 per cent.
- Side door protection.
- Car door fastenings.
- The equipment and training of car inspectors.
- Heavy repairs to foreign line cars.
- The inadvisability of handling car load freight on card billing.
- Means of securing the co-operation of the public in loading and releasing equipment.
- Handling live stock in compliance with the federal law.
- Railroad and highway grade crossing protection.
- The bonus system of paying freight house employees.
- The early closing of freight houses.
- The elimination of overs and shorts.
- The charge for spotting cars on private side tracks.

A Unique Report on Missouri, Kansas & Texas

A Study of the Value of Each Mortgage Line as an Independent Road and as Part of the Katy System

UNDER date of October 16, 1916, Coverdale & Colpitts, consulting engineers, 66 Broadway, New York, made a report on the Missouri, Kansas & Texas system to the bankers who are at work on a reorganization plan for the railroad company, namely, Hallgarten & Co. and J. & W. Seligman & Co. The report includes a brief description of the property and of the territory tributary thereto, and gives a short history of the company and a recapitulation of its physical and financial conditions. The following is an abstract, in general much condensed, of certain portions of the report:

The Missouri, Kansas & Texas is situated in Missouri, Kansas, Oklahoma, Louisiana and Texas, these states having a population of 12,194,369, of which the Missouri, Kansas & Texas serves about 38 per cent. The company was re-organized in 1891 with \$62,500,000 bonds, \$13,000,000 preferred stock, \$47,000,000 common stock and annual fixed charges of \$2,538,650. At the date of receivership in 1915 the company had \$141,034,255 bonds and notes, \$2,742,563 loans and bills payable, \$13,000,000 preferred stock, \$63,300,000 common stock and annual fixed charges of \$6,411,965. The reorganization plan of 1891 made no provision for future capital, so that every addition had to be mortgaged to raise funds for its construction or purchase. From 1891 to 1916 the system was expanded from 1,652 miles to 3,604 miles.

INCOME ACCOUNT IN THE PAST

The company's records show an average annual net income available for interest for the period 1911-15 of \$7,169,385, and average annual interest charges of \$5,944,971. Out of the average surplus of \$1,224,414, annual payments to sinking funds and for equipment trusts maturing amounted to \$589,416. The income account taken from the company's books, however, reflects conditions which, in the opinion of the engineers making the report, should not be permitted. More liberal provision for maintenance and renewal of physical property and improvement and betterments must be made. Revising the income account for the years 1911-15 by making adequate charges for maintenance and depreciation would show an average of \$6,219,185 only available for interest charges. The engineers are of the opinion that the property should earn about twice its interest charges, or in other words, that the reorganization plan should be such that the company's interest charges would not exceed about one-half of the average annual net income available therefor over a five-year period.

NEW MONEY REQUIRED

A total of \$26,636,219 new money is required to carry through a reorganization and rehabilitate the property. Of this, \$9,636,219 should be provided at the date of reorganization to pay net floating debt, equipment trust maturities, San Antonio terminal notes and to provide working capital. Of the remainder, \$8,500,000 should be provided one year after reorganization and \$8,500,000 the second year after reorganization.

FUTURE INCOME

Assuming that the new money is raised, that the operating revenues of the current fiscal year are abnormal and will return to normal in 1918 and thereafter increase at the rate of about \$750,000 per year, and that the operating ratio will decrease from 77 per cent in 1917 to 72 per cent in 1920, and allowing for 12 per cent return on money invested in equip-

ment and 6 per cent on half of other new money in addition to the decreased operating ratio, there would be available for interest and improvements \$7,136,000 in 1917, \$7,275,000 in 1918, \$8,642,000 in 1919 and \$9,664,000 in 1920.

VALUE OF INDIVIDUAL PROPERTIES

The component parts of the Missouri, Kansas & Texas are divided as follows: (1) Main trunk, to which all other parts are in greater or lesser degree accessory (the lines covered by the Missouri, Kansas & Texas first and second mortgage, extending from the crossing of the Missouri river at Boonville, Mo., to Granger, Tex., constitute the main trunk); (2) bridges, or lines which have little originating or terminating traffic, but over which is moved traffic originating on one part of the system destined for some other part; (3) feeders, or lines which either originate traffic or distribute it.

In determining the value of each of the different mortgage lines, legal questions and questions relating to the guarantee of bonds of subsidiary companies of the Missouri, Kansas & Texas are disregarded as being outside the scope of an engineering investigation. The report assumes that any specifically mortgaged property may be detached from the system and an estimate is made of the effect of segregation upon the system's net revenue. In the case of lines which constitute bridges for system traffic, alternative routes have been chosen to replace the segregated line either by the use of other lines of the system or by obtaining trackage rights.

In determining the effect upon the system's gross revenue of the segregation of a line, all factors pertaining thereto were given consideration, including the nature of the traffic, its origin and destination, whether competitive or non-competitive, its natural routes, and the division of through rates which it would be necessary to accord to retain it. The loss of revenue from each source was estimated rather than the amount which would accrue to the system in the event of the segregation of a line.

The local freight and passenger earnings of a line were considered to be wholly lost to the system. On forwarded and received traffic it was estimated that the Missouri, Kansas & Texas would allow a segregated line such divisions of the rate as would be necessary to preserve the present routing. Passenger traffic rates were divided on a mileage basis. Pass-over freight would be preserved to the system through the use of alternative lines. The revenue from the carriage of mail was ascertained by mail routes and allocated proportionately on a mileage basis. Where the segregated line was replaced by an alternative route, all local mail revenue would be lost to the system and all through mail revenue preserved to it.

Express and other miscellaneous revenue is allocated directly where possible and where this is not possible is divided in the ratio of total proportionate revenue earned by each line.

The great bulk of the system's equipment is covered by the first and refunding mortgage, the first mortgage, the general mortgage and equipment trusts. The amount of equipment covered by specific mortgage on any of the lines which are to be studied separately is in no case sufficient for the operation of the line.

The equipment released from service on the separately mortgaged lines, if they were to be segregated, would add something to the earnings of the main trunk, and the net revenues from this source are taken at about one-half of the amount that would be earned if the released equipment were

continuously employed. No amount is credited for released passenger equipment.

The effect of the system's operating expenses, taxes, etc., of the segregation of a line was determined by reference to the detail accounts and statistics pertaining to each property. The arbitrary apportionment of certain items that was necessary is negligible and all such computations were susceptible of reasonably accurate determination.

Missouri, Kansas & Eastern.—This line, 163 miles, gives the main trunk its connection with St. Louis and has outstanding against it \$4,000,000 first mortgage bonds, \$58,000 second mortgage bonds, and \$1,924,000 St. Louis division first and refunding 4 per cent bonds, the total annual interest charges being \$279,860. The line has 0.5 per cent grades, 6 deg. curves, and is ballasted with burnt clay. The average weight of rail is 77 lb. It is in fair physical condition but subject to washouts. An alternative route could be secured by trackage rights over the Chicago & Alton and Chicago, Burlington & Quincy. The value of this line, after paying its operating expenses, over and above what it would cost to secure trackage rights and pay operating expenses thereon, averaged for 1914 and 1915 \$137,000. On the other hand, if the line had been operated independently it would have had an operating deficit, without providing for any interest charges, of \$101,000.

Kansas City & Pacific.—This line, 128 miles, connects the main trunk with Kansas City and points on the Missouri, Kansas & Oklahoma and has outstanding \$2,500,000 first mortgage 4 per cent bonds, with total annual interest charges of \$100,000. The maximum grades are 1.2 per cent, with some 4 deg. curves. The average weight of rail is 82 lb. The track is ballasted with chats and shale. The line is in fairly good physical condition but is subject to damage by floods. An alternative Kansas City line could be secured by acquiring trackage rights over the St. Louis-San Francisco and the Missouri Pacific. The value of this line to the system over and above what the alternative route trackage rights would cost was on the average in 1914 and 1915 \$244,000 per year. If the line were operated independently the average deficit in each of those two years would have been \$78,000 without allowing for any interest charges.

First Extension Mortgage Lines.—These are branch lines totaling 167 miles, of which the longest is the line from Cherokee Junction to Joplin, 55 miles. This Cherokee Junction-Joplin line and the Krebs-Wilburton line tap coal mines and some of the system's fuel coal originates thereon. There are \$3,253,000 Missouri, Kansas & Texas first extension mortgage 5 per cent bonds outstanding against these lines, with total annual interest charges of \$162,650. The lines are generally in poor condition. The value of these lines to the system averaged \$111,000 annually in 1914 and 1915. On the other hand, if the lines were to be operated independently there would have been an operating deficit annually of \$129,000.

Missouri, Kansas & Oklahoma.—This line runs from a point near South Coffeyville, on the main trunk, to Oklahoma City, with branches from Fallis to Guthrie and from Osage to Wybark, a total of 275 miles. There are \$5,468,000 M. K. & O. first mortgage 5 per cent bonds outstanding, with annual interest charges of \$273,400. The line has 1 per cent grades and 4 deg. curves and is laid with 65-lb. rail and ballasted with burnt clay, chats and screenings. The physical condition of the main line is only fair and that of the branches is poor. The value of this line to the system was in 1914 \$505,000. If the line had been operated independently there would have been \$296,000 net operating revenue available for interest. In 1915 the net earnings were even higher, but in both 1914 and 1915 were abnormal, due to the opening and development of the Cushing oil fields. Since 1915 this business has been falling off, due to the construction of pipe lines.

Texas & Oklahoma.—This line, 121 miles, runs from a connection with the Missouri, Kansas & Oklahoma, at Oklahoma City, to Colgate. It has \$2,347,000 Texas & Oklahoma first mortgage 5 per cent bonds, with annual interest charges of \$117,350 outstanding against it. The line has 1 per cent grades and 4 deg. curves, is laid with 65-lb. rail, is largely unballasted, is in poor physical condition, and is subject to frequent floods and washouts. The operation of the line in 1914 as a part of the Missouri, Kansas & Texas system caused a deficit to the system over and above the line's interest charges of \$32,000, and had the line been operated independently its operating deficit before making any allowance for interest charges would have been \$122,000.

Wichita Falls & Northwestern.—These lines, totaling 380 miles, run from Henrietta to Elk City, from Wellington Junction to Wellington, and from Elk City to Forgan. Owing to the interdependence of traffic and the way in which the liens of the mortgages are distributed, the first and refunding mortgage 5 per cent bonds, of which \$2,133,000 are outstanding; the first lien collateral trust mortgage 5 per cent bonds, of which \$843,000 are outstanding, and the first and refunding mortgage 5 per cent bonds, of which \$3,534,000 are outstanding, must be considered as attaching to the entire 380 miles of line in the order named. The interest charges on these issues of bonds are \$106,650, \$42,150 and \$176,700 respectively. The greater part of these lines is laid with 66 and 60-lb. rail; the track is unballasted and difficult to maintain. The value of these lines to the system averaged annually in 1914 and 1915 \$296,000. If the lines had been operated independently they would have shown a net operating revenue available for interest charges of \$271,000.

Wichita Falls & Southern.—This line, 56 miles, runs from Wichita Falls to New Castle and has outstanding against it \$729,000 Wichita Falls & Southern first mortgage 5 per cent bonds, with annual interest charges of \$36,450. The line is laid with 60-lb. rail, is unballasted, and is in bad physical condition. The operation of this line caused the system, before making allowance for interest charges, an annual deficit in 1914 and 1915 of \$9,000. Had the line been operated independently the annual deficit would have been \$36,000.

Denison, Bonham & New Orleans.—This branch, 24 miles, serves the town of Bonham, Tex., which is also served by a branch line of the Texas & Pacific. There are \$350,000 D. B. & N. O. first mortgage 5 per cent bonds issued against the line, all of which are deposited under the M. K. & T. consolidated mortgage. The line has 1 per cent grades, 4 deg. curves and 60-lb. rail and is unballasted. The average annual operating deficit as part of the system in 1914 and 1915 was \$21,000, and had the road been operated independently, the average annual deficit would have been \$41,000.

Dallas, Cleburne & Southwestern.—This 10-mile branch, which serves Cleburne, has \$150,000 D. C. & S. W. first mortgage 5 per cent bonds issued against it, all of which are pledged under the consolidated mortgage. The average annual deficit in 1914 and 1915 as part of the system was \$6,000 and would have been \$17,000 had the line been operated independently.

Beaumont & Great Northern.—This is one of the so-called orphan lines of the Missouri, Kansas & Texas system. It runs from Weldon, Tex., to Livingston, 48 miles, crossing the Trinity-Colmesneil line, which line is covered by the M. K. & T. first mortgage. The B. & G. N. has outstanding against it \$883,000 B. & G. N. first mortgage 5 per cent bonds, with annual interest charges of \$44,150. The Weldon-Livingston line runs through an almost virgin timber district. Operated as part of the system, the average annual amount available for interest in 1914 and 1915 was \$59,000. Had the road been operated independently it would have shown an annual operating deficit of \$2,000.

Texas Central.—This line, which runs from Waco, Tex.,

to Rotan, with a branch from De Leon to Cross Plains, a total of 309 miles, has outstanding \$1,850,000 Texas Central first mortgage 5 per cent bonds and \$150,000 Texas Central first mortgage 4 per cent bonds, with total interest charges of \$98,500. The Texas Central from Waco to De Leon has 1 per cent grades and is laid with 75-lb. rail, and between De Leon and Rotan has 1.5 per cent grades and is laid with 58-lb. rail. Most of the line is ballasted with gravel or rock. The Cross Plains branch is unballasted. Operated as part of the system, the Texas Central showed an average annual amount in 1914 and 1915 available for interest of \$171,000. If the line had been operated independently the annual net income available for interest would have been \$19,000.

Dallas & Waco.—This line runs from Dallas, Tex., to Hillsboro, 66 miles, and forms a part of the main line of the system via Dallas. There are \$1,340,000 D. & W. first mortgage 5 per cent bonds outstanding against it, with annual interest charges of \$67,000. The line has 1 per cent grades and 4 deg. curves, is laid with 66-lb. rail, and ballasted with burnt clay. Operated as part of the system the road showed \$188,000 available for interest in the year 1915, but if operated independently would have shown an operating deficit of \$10,000.

Missouri, Kansas & Texas of Texas.—The total mileage of the Missouri, Kansas & Texas of Texas is 219, made up of the lines from Denison to Sherman, Boggy Tank to Houston, Granger to Austin, San Marcos to San Antonio, and Lockhart to Smithville. These lines are covered by the M. K. & T. first mortgage, under which \$4,505,000 5 per cent bonds are outstanding, with annual interest charges of \$225,-250. In general, these lines are in good condition and while they originate little traffic except at San Antonio, Austin and Houston, they are of first importance to the system in giving it its connection with the above mentioned cities and with Galveston. Alternative routes could be secured by trackage rights, but the value of these lines to the system over and above what it would cost to operate under trackage rights averaged annually in the years 1914 and 1915 \$339,000. It is estimated that if the lines had been operated independently there would have been an operating deficit in these years.

Sherman, Shreveport & Southern.—This line, which runs from McKinney, Tex., to Shreveport, La., 201 miles, has outstanding \$3,689,000 S. S. & S. first mortgage 5 per cent bonds, of which \$1,689,000 are in the hands of the public and \$2,000,000 deposited under the Missouri, Kansas & Texas first mortgage, with interest charges on the bonds in the hands of the public of \$84,450. The line has 1.6 per cent grades and 5 deg. curves, is laid with 60-lb. rail, and only about one-tenth of it is ballasted. The line is in poor physical condition. Operated as part of the system, the average annual deficit in 1914 and 1915, before any provision was made for interest charges, was \$346,000 and if the line had been operated independently the annual deficit would have been \$536,000.

Missouri, Kansas & Texas First and Second Mortgage Lines.—The lines covered by the first and second mortgage total 1,448 miles, and there is included in addition 22 miles of line on a rental basis and 228 miles of trackage rights, making a total of 1,698 miles. These lines form the main trunk of the system, with many important branches. The average weight of rail on the main line is about 84 lb. and 68 miles of line is double-tracked. The main line is ballasted with crushed rock, chats, burnt clay or gravel. Included under the first and second mortgage is about 20 per cent of the total equipment of the system. The lines are covered by the Missouri, Kansas & Texas first mortgage, under which there are \$39,999,500 first mortgage 4 per cent bonds outstanding, and by the M. K. & T. second mortgage, under which there are \$20,000,000 4 per cent bonds outstanding. The total annual interest charges are \$2,399,980. The

average net income of the system available for interest in 1914 and 1915 was \$6,015,000. Subtracting from this \$6,015,000 available for interest the amount contributed by the mortgage lines previously mentioned, which showed something available for interest when operated as part of the system, and subtracting also 6 per cent interest on the valuation of properties other than railroad lines which are pledged under various mortgages—\$1,428,000, and letting the first mortgage lines bear the burden of the total \$414,000 deficit which certain of the separately mortgaged lines show even when operated as part of the system, we have an amount of \$2,537,000, which is the annual average available for interest in 1914 and 1915.

Equipment and Other Physical Properties which could not be valued directly on an income basis were appraised at their present value and the mortgages covering such properties were credited with an income calculated at 6 per cent per annum on this valuation.

HIGHER FREIGHT RATES IN EUROPE TO PAY HIGHER WAGES

(By Our Special European Correspondent)

While railroad men in the United States were asking for wage increases, in Europe they were getting them. In Europe at the same time the question is being asked: "Is it fair and logical to pay one man ten cents a day to risk his life on the firing line to protect another man while this other man holds on to his peace time job and gets an increase of wages for so doing?" The question is also being better put: "If the soldier gets ten cents a day, how much less should the protected man receive?" The depth of ironic bitterness in these questions cannot be appreciated in America where only money and not life is involved in the demands of railway men.

Here's the way the man with the ten-cent job looks at the proposition. Two soldiers lately hopped off a troop train at Mestre, the big transfer station in the north of Italy, and made a bee-line for a wine shop nearby. While they were drinking their glass, the train, which had stopped for an uncertain number of minutes, got word that the way ahead was clear and it pulled out leaving the two soldiers behind. As its rear end passed out from under the roof of the station platform, they saw and realized their fix. Either they had to catch that train or else look forward to some unpleasant days in the guardhouse, a reduction of their daily pay of ten cents, and other like punishments.

The two soldiers, not being railroad men but peasants from the country, undertook to overtake that train. They hotfooted it down the dusty wagon road running alongside the tracks. One soldier was short and fat, the other tall and lean. The fat man, despite all his efforts and the frequent mopping of the red spot on the top of his head where his hair once grew, soon began to lag behind.

"I say, wait for me, won't you?" he shouted to his tall comrade. "You know, you got me into this fix anyway. I didn't want to take a chance, but you persuaded me." The tall man slowed down, though grumbly, and thus the pair, hotter and thirstier than ever and still quarreling, at last came to the end of the first lap of their troubles at the way station a couple of miles to the north of Mestre. There they took counsel of the flagman at the crossing, who was comfortably smoking his pipe, waiting for the next train to pass.

"You two are a pair of fools," he announced tranquilly. "Why don't you wait for the next train? It'll catch up with that train of yours somewhere along the line."

This advice seemed good to two men who had run themselves almost blind, so they sat down with the flagman and rested. While resting they began to think of what waited for them in the far fighting country ahead, in the way of hard-

ship if not death, and what lay ahead of the flagman in the way of easy living.

"I say, things are pretty easy for you railroad men," at last commented the fat soldier.

"Well, that is as maybe," admitted the flagman. "But when we get that increase things will be better. It's been pretty hard to make ends meet with prices of meat and sugar and coffee and the like jumping every month."

The country soldier's eyes began to widen. "So you are getting an increase of pay, eh? Well, I wish I had some pay of any kind." He lapsed into deep thought and didn't wake up until the train slowed down that he hoped would get him out of his difficulties.

"Come along," said his tall comrade. "What are you thinking about, anyway?"

"I was thinking how nice it would be to be a railroad man," sighed the fat soldier as he climbed aboard.

There are a lot of soldiers all over Europe who have thought along the same lines as this fat, slow witted peasant soldier. Not only soldiers but men out of work because of the war have also thought so, and very hard, since the Italian ministry in early September raised wages on government owned lines which comprise all important ones in Italy. This step itself was illogical in the extreme, but the step following it was a logical consequence of the first step. In order to get the extra four million dollars a year, the freight rates were raised 10 per cent, and slight additions made to the passenger tariff. The increase applies to a total of 118,413 men, 13,678 of whom are serving in the war zone. The average increase per man per year for all employees receiving a wage of \$600 or less is \$50. Provision was also made to reinstate under certain conditions employees who had taken part in the strikes of 1907 and 1914.

The increase was obtained on the specific ground, following agitation in Italy by the unions similar to that in France, England and Spain, that the cost of living had so advanced that it was no longer possible for the men to work under the old conditions. It is true that the cost of articles of food and clothing has advanced 10 to 30 per cent and even more. Food prices all over Europe are virtually as high as they are in New York City. Best eggs are 50 cents a dozen in the cities, butter is 50 cents a pound, while sugar is 20 cents a pound. Coal for heating purposes is \$30 to \$40 a ton, and therefore quite out of reach of all but the well-to-do. Rent is the only item which has not advanced and in some cases it has been lowered. Clothing, particularly woolens, has advanced also as well as shoes. It may well be said that human life is the only cheap commodity in Europe.

However, as all things are relative, it should be pointed out that these increases of wages, which would ordinarily have been proper, came at a time when the majority of the able bodied men of the country were either out of work or else giving their time if not their lives to the country at ten cents a day with an additional sum of 20 to 40 cents a day for the keep of their families, a sum regulated by the number of children.

The railroad men in making their demands for higher wages appear to have selfishly and completely ignored the comparative conditions existing in the nation. Their arguments were based on the usual peace-time figures proving that railroading could not be considered a career at such wages, that a man with a family could not raise his children properly, neither feed nor clothe them, that they were working overtime, and so forth.

Nobody questions the fine work done by railroad men all over Europe in this war, but sight must not be lost of the fact that they have had their lives spared, that they have not undergone any of the hardships and the horrors of the soldiers of the trenches, and that from a salary point of view they have been able to keep their families together while the civilian, the ordinary commercial employee going under arms

in most cases has had his salary cut off at once and has had to leave his family to shift for itself while he marched towards death.

The plain truth seems to be that the brotherhoods of railway men the world over have unconsciously joined in a concerted effort to obtain raises in wages irrespective of local conditions. Everywhere these men support politicians and are in turn supported by them. In Italy the new ministry, the one granting wage demands, has a decidedly socialistic color, for instance, and no doubt that element counted in the decision.

As noted, the money to pay the higher wages came out of the pocket of the public, by raising freight rates 10 per cent. How long will the public continue to pay? How long will it permit class privileges? If the railroad men are given an increase, why not let the government vote to support store clerks out of employment or working for nothing to keep their jobs until after the war? Why not loan money to hotel keepers to prevent their failure? These are some of the questions asked in the Italian press.

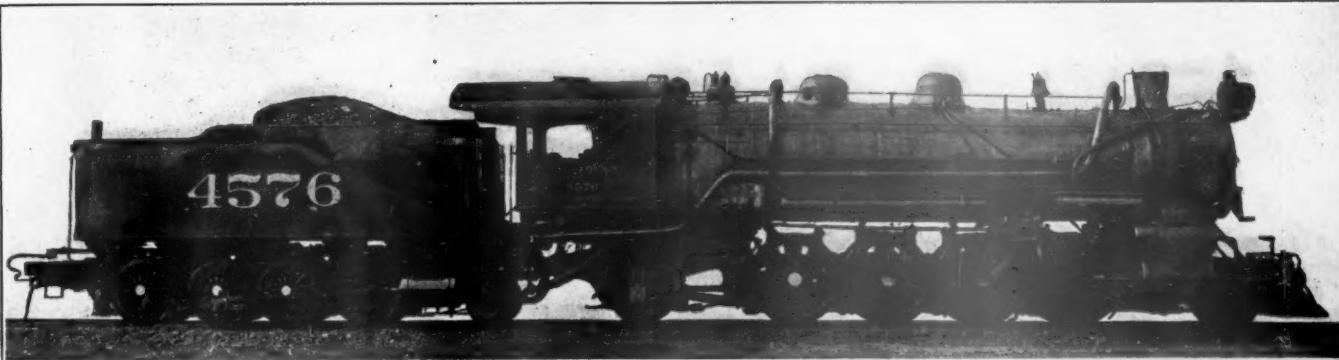
This raising of wages of railway men is but a presage of what will come in the way of spending public money after the war. Soldiers who have been killed cannot ask for indemnities, but crippled soldiers can and will, and when the governments have strained their credits to the breaking point, it seems plausible to suppose that the whole matter will be regulated in the way that man's folly is generally regulated. Nations may go broke, there may be a collapse of credits, with the usual panics and corrective hard times, savored with the salt of bitterness and suffering.

There are many conservative thinkers in Europe now whose privately expressed opinion is that Europe cannot stand up under the burdens she is about to be called upon to bear. The war's destruction, they think, she might well survive. But, given the rapidly growing thought among the common people that the governments of the past years, which permitted such a disaster as this war, have proven themselves more incompetent and more criminal than any socialist governments could possibly have been, and given the growing demands of socialists and labor people, these thinkers fear a Europe absolutely dominated by ignorant radicals. These thinkers point to the condition of England many years before the war, to her loss of commercial markets to the Germans, and they predict no less in the long run than the domination of Europe by the cheap labor of the yellow races. They do not fear the yellow race with the rifle and the sword but armed with the cheap labor of its hands.

If in time of war the railroad men of Spain can go on strike and obtain what they ask, if the railroad men of France can dare to ask what they are asking, if the companies and the government are too weak to resist such demands when they have armies at their back, if the government of Italy raises wages at such a time, what will their answer be to such demands when the war is over and when such demands will come from every side?

Here's a little incident that shows the way the wind blows in France. Only lately all the different brotherhoods of the Paris-Lyons & Mediterranean, a privately owned road, met in Paris, formed a single brotherhood, voted that other brotherhoods should unite with them to form a single national one of the railroad men, then asked for more wages, and finally voted a resolution disapproving any increase of railroad freight or passenger rates deemed necessary to secure the funds to pay such increased wages.

Today the American abroad is regarded as a fortunate man, as one who can keep on earning money, living decently, while all of Europe is in unhappy turmoil. His country is regarded as the most fortunate of countries in all the world. But if her wage earners are stricken with the madness of Europe, they may be robbed of these blessings of peace so envied by Europe.

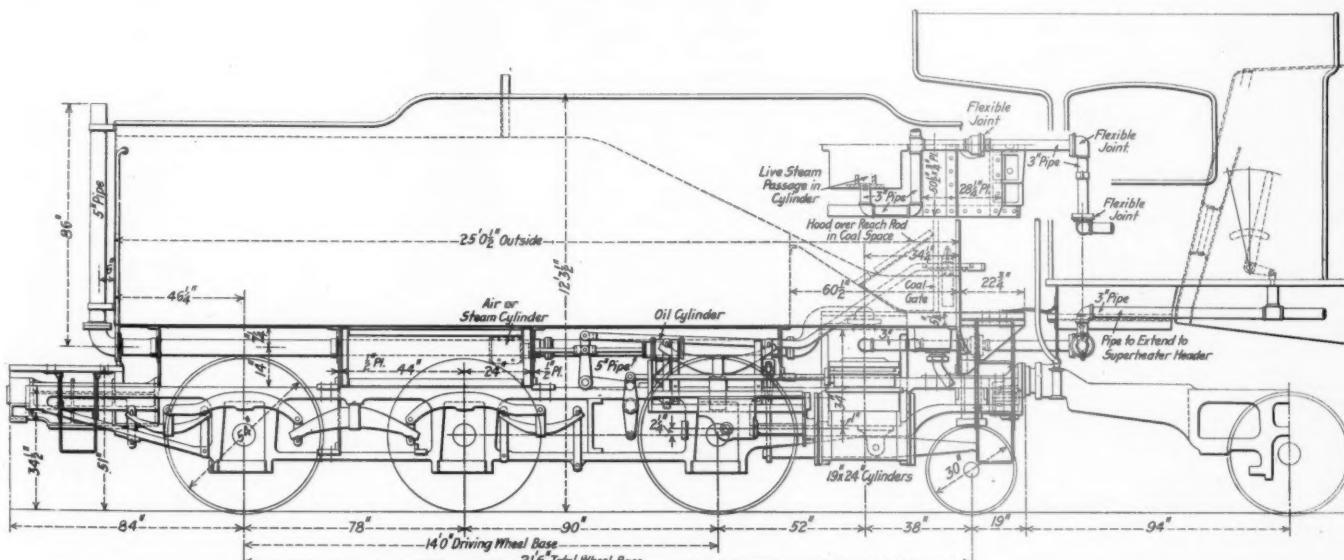


Duplex Locomotives for the Southern Railway

Running Gear and Machinery of Retired Engines Applied to Mikado Tenders with Economical Results

BY the application of the running gear and machinery of retired Mogul and Consolidation locomotives to the water tanks of existing Mikado locomotives, the Southern Railway has materially increased the capacity of these locomotives without increasing the wheel load and with a marked decrease in fuel consumption per ton-mile. This has been done with but little change to either the running gear or the water tanks of the Mikados. In fact, it is as though the boiler were lifted from the retired locomotive and the water tank of the Mikados placed on the frame in lieu thereof, the running gear and machinery, together with the cylinder castings and frame remaining intact.

with this pipe. This has been added in order to provide greater steam supply to the tender engine for peak loads on heavy grades. The saturated steam supply and the superheated steam supply are controlled separately by gate valves in each pipe, operated from the cab. The steam supply to the Mikado engine itself is also independent of these two sources. The reversing mechanism for the tender engine is controlled from the engine deck as indicated in the drawings. The reach rod is provided with notches to give full gear, three-quarter gear, one-half gear and one-quarter gear forward, and full gear and three-quarter gear backward. The reversing gear of the tender engine may be operated by any suitable



General Arrangement of Mogul Running Gear and Machinery Applied to a Mikado Tender

The diameter of the cylinders of the tender engine has been reduced, which, with the reduction of one inch in diameter of the Mikado type cylinders, does not overtax the Mikado boiler to any great extent. In addition to the reduction in cylinder diameter, the boiler capacity has been increased by the addition of brick arches and a feed water heater which uses the exhaust steam from the air compressor.

Steam for the tender engine is taken directly from the superheater header through a well lagged 3-in. pipe extending backward underneath the cab, as shown in the illustration. A second pipe, which permits the added use of saturated steam taken direct from the top of the boiler is also connected

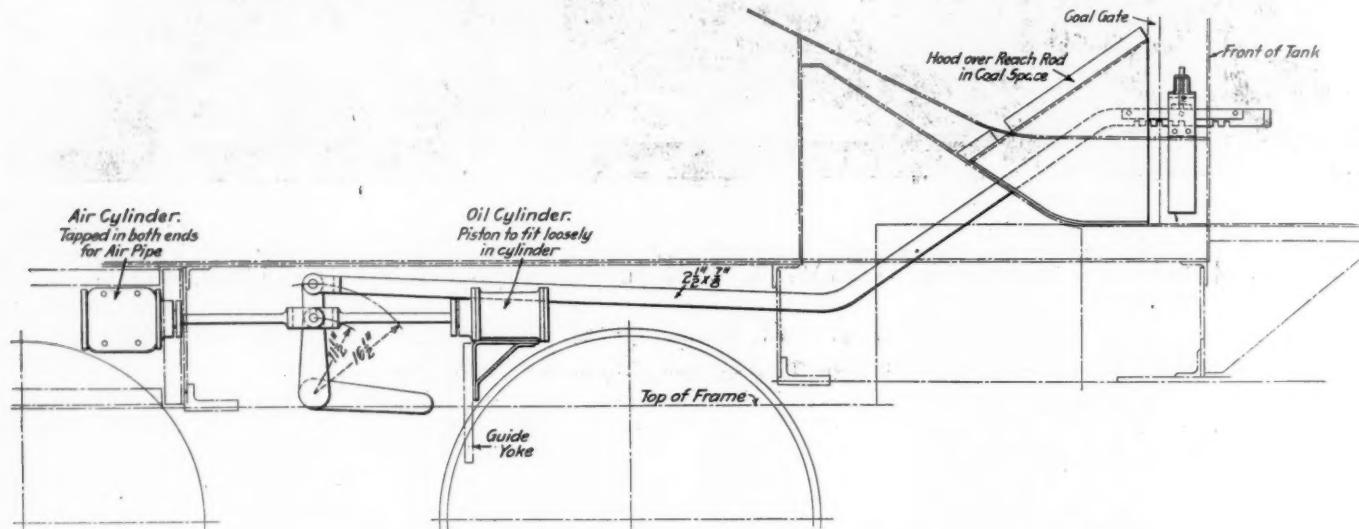
reversing mechanism, and, where operated by hand, an air cylinder with an oil cylinder dash pot is used to assist in the movement of the gear. The photograph shows the application of the running gear and machinery of a Consolidation locomotive to the tender, while the drawings show the application of the Mogul type engine to the tender. In either case the details are substantially the same.

With the application of the Consolidation running gear to the tender the draw-bar pull of the Duplex locomotives, is 39 per cent greater than that of the original Mikados. The locomotive is operated at 175 lb. boiler pressure which, with 27-in. by 30-in. cylinders and 63-in. drivers in the original

Mikados, gives a tractive effort of 51,600 lb. By reducing the diameter of the cylinder to 26 in. the tractive effort of the Mikado locomotive was reduced to 47,900 lb. The tractive effort of the tender unit in case of the Consolidation locomotive, with 20-in. by 24-in. cylinders, and 50-in. driving wheels is 28,600 lb., making a total of 76,500 lb. Tests have shown

of the line there is a 1.5 per cent grade for 5 miles, with many reverse curves.

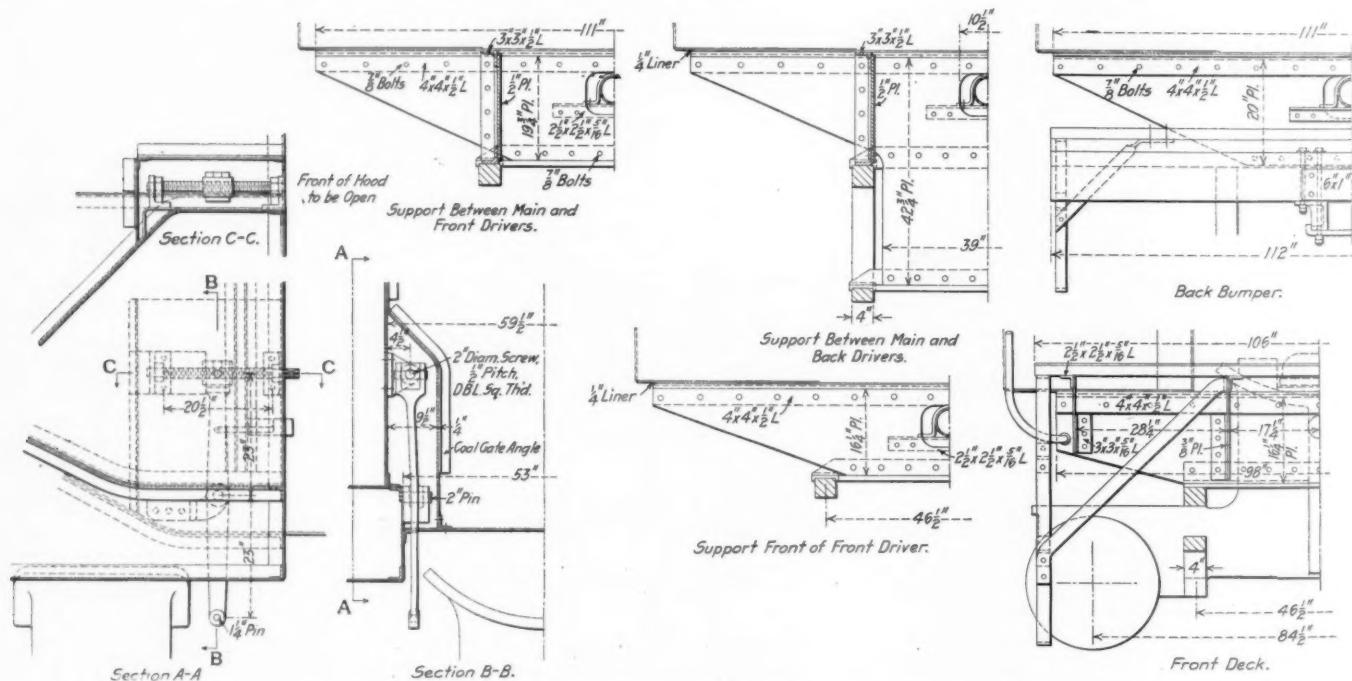
For the remaining distance, 46 miles, there is one short grade of 1.7 per cent with reverse curves and a slow approach which, with other grades of the same percentage but with less curvature, limits the capacity of the single Mikados to 1,150



Arrangement of Reversing Gear for the Tender Engine of the Duplex Locomotive

that the draw-bar pull available from the combination is 64,-000 lb., as compared with 46,000 lb. for the single Mikado, or an increase of 39 per cent. It has been found that the maximum draw-bar pull of the Duplex locomotives can be sustained on a continuous pull for 50 minutes. Several of these locomotives have been installed on the line between Asheville, N. C., and Hayne, S. C., a distance of 68 miles.

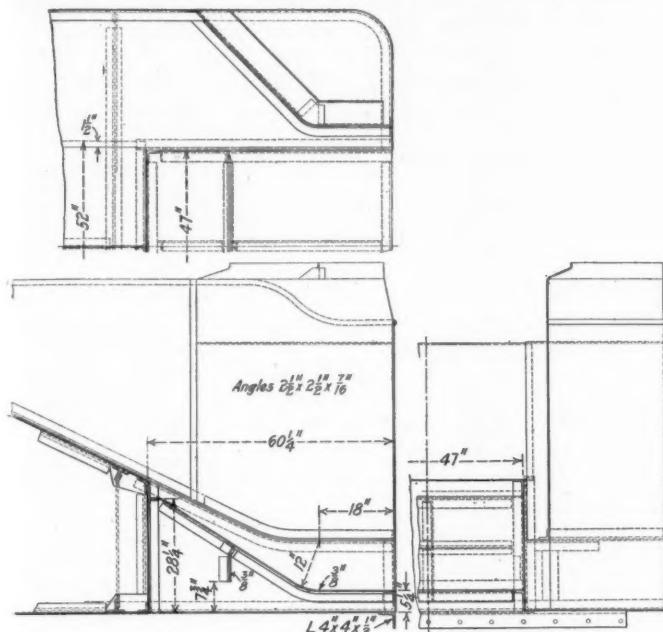
tons. The Duplex locomotives will handle 1,600 tons, or an increase of 39 per cent. The average for the whole eastbound trip is 77,100 ton-miles for the single Mikado locomotives and 104,400 ton-miles for the Duplex locomotives, or an increase of 36 per cent. In handling this additional tonnage the Duplex locomotives burn substantially the same total amount of coal as the single Mikados, the average for the



Details of Supports for the Tank on the Mogul Type Tender Engine

On this line, eastbound, the heavy traffic direction, there are Mikados being 18 lb. per 100 ton-miles, and for the Duplex 1.5 per cent and 1.7 per cent grades. With the single Mikado locomotives 12 lb. per 100 ton-miles. The engine crews on locomotives the maximum tonnage handled over the first 22 this line make a round trip of 136 miles in an average run-miles of this line is 1,100 tons. The Duplex locomotives willning time of from 12 to 13 hours. handle 1,400 tons, or an increase of 27 per cent. On this part The Mogul tender units have 19-in. by 24-in. cylinders

with 54-in. drivers, which with 175-lb. boiler pressure, gives a tractive effort of 23,850 lb. This, added to the 47,900-lb. tractive effort of the improved Mikado locomotives, gives a



Front End of the Tank as Redesigned for the Duplex Locomotive

total tractive effort of 71,750 lb. In only the Mogul application is the factor of adhesion with the minimum weight of tender much too low. In this case, with the tender practically empty of water and coal, a factor of adhesion of only about

adhesion is about 3.25 and inasmuch as this unit is used more than the Mogul unit, but little difficulty is experienced in this regard. The weight of the tender unit with the Consolidation wheel arrangement is 176,000 lb. maximum and with the Mogul wheel arrangement, 152,000 lb. maximum.

The drawings show the application of the running gear and machinery of a Mogul type locomotive to the water tank of the Mikado type locomotive. The entire lower part of the Mogul locomotive remains practically unchanged. The cylinder casting is retained intact and the front and rear draft castings are changed slightly, the front draft casting being shown in one of the illustrations. The upper rails of the frames are 4 in. by 4 in. and the lower rails are 4 in. by 2 1/2 in. The water tank is supported on the frames by five 1/2-in. transverse plate supports riveted to 4-in. by 4-in. by 1/2-in. angles on the water tank and to frame cross braces at the frames, and by a 1/2-in. plate support about 5 ft. long on each side of the tank over the main drivers. The fourth transverse plate support extends down to the lower rail of the frame. The 3-in. steam pipe running to the tender engine contains three ball joint connections between the engine and tender to give the necessary flexibility. The exhaust from the cylinders passes through a 5-in. pipe to the rear of the tank. This pipe is clamped at each of the transverse supports by a strap riveted to a 2 1/2-in. by 2 1/2-in. by 5/16-in. angle riveted to these plates.

A pocket is formed in the tank at the front end to provide proper clearance for the rear cylinders, it being redesigned, as shown in the drawings. The Mikado type boiler has a total heating surface of 3,231 sq. ft., with a grate area of 54 sq. ft. The weight on the front engine drivers is 215,700 lb., with a total engine weight of 272,940 lb. The tank has a capacity of 8,000 gal. of water.

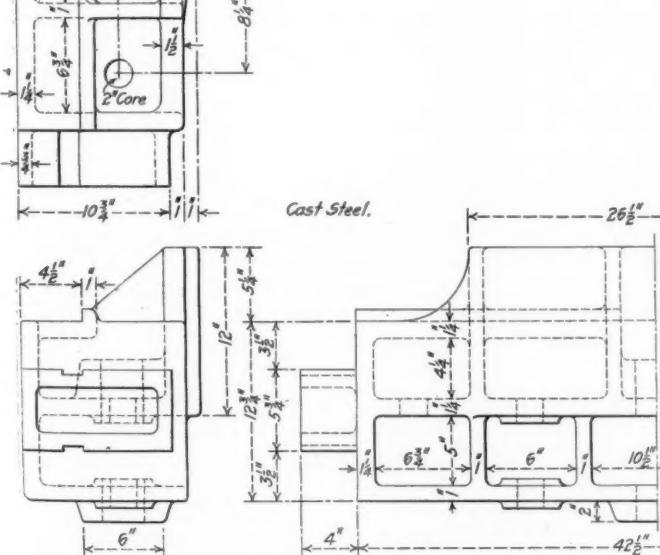
CONCRETE INSTITUTE CONVENTION

The thirteenth annual convention of the American Concrete Institute was held at the Hotel La Salle, Chicago, February 8 to 10 inclusive. About 250 members and guests registered. Leonard C. Wason, president of the Aberthaw Construction Company, New Haven, Conn., was president of the association during the past year and presided over the meetings.

The program was made up partly of individual papers and partly of formal committee reports. A large amount of valuable information was presented, much of which brought out interesting discussion. Road and building construction, as usual, occupied considerable space on the program. Flat slab design, while not playing as important a part as in previous meetings, came in for a lively part in the discussion.

The report of the committee on reinforced concrete and building laws, which will be submitted to a vote of the association by letter ballot, called for considerable discussion on the section devoted to the design of flat slabs, because it proved to be much more liberal in its provisions than that appearing in the report of the Joint Committee on Concrete and Reinforced Concrete. It was pointed out that the form submitted by the committee conforms in the most important features with the rules of the building department of the City of Chicago, a well known and widely discussed specification on this subject. Arthur R. Lord, consulting engineer, Chicago, Ill., and a member of the committee, also presented a paper on long time tests of a flat slab floor.

A valuable paper covering a subject on which much information is sorely needed was that presented by Sanford E. Thompson, consulting engineer, Boston, on slag and cinders as aggregates. Considerable discussion was brought out by the paper on Flow of Concrete by E. B. Smith, United States Bureau of Standards, Washington, D. C. This was a report on the results of compression tests on concrete specimens continued for a long period of time and which go to



Front Draw Casting of the Rear Engine Unit of the Duplex Locomotive

2.25 is obtained, while in both cases the maximum factor of adhesion, that is with the tender loaded, is 5.25. In case of the Consolidation tender unit the minimum factor of

show that concrete flows under stress or in other words that concrete continues to compress with the continued application of the load so that the maximum deformation is much more than that which becomes apparent immediately after the load is applied. Prof. Willis A. Slater of the University of Illinois gave a report on tests of a thin flat dome composed of unit constructed concrete tile, $2\frac{1}{4}$ in. thick, which not only developed a material strength but is self supporting during construction, thus doing away with the need of centering or forms.

A paper describing a course of instruction in reinforced concrete was presented by Prof. William K. Hatt of Purdue University in which he pointed out the problems confronting the instructor in presenting those features of reinforced concrete design in which an apparent disagreement exists between construction practice and theory, particularly in those phases of the subject where a purely scientific analysis is impossible. Attention was also drawn to the need of further tests to clear up certain matters not clearly defined at the present time.

UNIT CONSTRUCTION

John E. Conzelman, civil engineer, St. Louis, Mo., reviewed the development in the construction of the unit reinforced concrete members in an especially arranged yard or factory to be erected at the site of the structure after having been properly cured. He pointed to the particular advantage of the production of concrete under what he termed factory conditions and cited a long list of classes of structures which had been built according to this method. This included sea walls, caissons, docks, retaining walls, tunnel linings, culverts, pipes, sewers, fence posts, poles, buildings, bridges, round-houses, train sheds, etc. In his opinion the railway field offers a material opportunity for development along this line and such structures as engine houses, freight sheds, snow sheds, train sheds and small stations offer special opportunities for the development of unit standards. Savings of 30 to 40 per cent were estimated as possible with the adoption of this type of construction. The paper was illustrated by lantern slides illustrating examples of structures of various kinds, including train sheds of the unit type at Denver, San Francisco and Los Angeles, concrete cribbing on the Rock Island at Chicago and a roundhouse of the Sante Fe at Riverbank, Cal. Attention was also drawn to the fact that, except for the very heavy slabs developed by the railroads themselves for trestle bridges, practically all of the unit construction done so far has been developed by a very small group of firms and individuals.

WET CONCRETE

The growing appreciation of the dangers attending the use of too much water in the mixing of concrete was evidenced repeatedly in the course of the convention. This was brought out particularly in connection with the discussion of hydrated lime. Bela Naga of the Hydrated Lime Bureau called attention to the increased plasticity of concrete to be secured with the use of hydrated lime whereby concrete may be made to flow in chutes or from buckets or cars much more readily than without this ingredient and further that its use did away with the common tendency to use an excess of water. He stated that there was no question but that concrete of maximum density and imperviousness can be secured through proper proportioning, grading, mixing and placing without the addition of any other ingredients than the cement, aggregates and water. He called attention, however, to the fact that the requirements to secure these results were difficult to realize under field conditions and that the use of hydrated lime materially reduced the difficulties encountered.

Attention was also called to the fact that contractors have purchased hydrated lime at their own expense when not required by the specifications for the work, because of the sav-

ings to be secured in labor, lower grades for the chutes and the general ease with which the concrete could be handled.

CONCRETE PILES

Charles R. Gow, consulting engineer, Boston, Mass., gave a lantern slide talk on concrete piles, plain and reinforced. He covered the subject of cast and drive piles, describing the usual form and also those intended for special purposes. This included piles designed to withstand exceptionally difficult driving conditions and those arranged to facilitate jetting. A special type was shown in which the pile is driven by means of a jacket so that the effect of the hammer is applied directly to the base of the pile and does not in any way effect the shaft.

Under methods of manufacture special emphasis was placed on the need of an unyielding foundation for casting the piles to insure that they will not be injured by settlement of the forms. The longitudinal reinforcement must be provided to withstand the stresses caused by lifting them preparatory to driving, but these stresses may be reduced materially by the use of special bridle rigs for lifting them. This was illustrated for a number of cases including the longest concrete pile ever made, 106 ft.

Driving caps were also illustrated, showing the method of using cushions of wood blocks, coiled ropes, sawdust and pieces of hose. The cast iron caps were recommended over those made of structural steel since the latter show a tendency to loosen up at the riveted joints during driving. A method of driving sheet piles by churning was also shown; that is, working the piles up and down by utilizing the effect of their own weight without the assistance of a hammer.

In comparing the precast piles with those built in place the former were recommended as being the safest, but with the disadvantage that it is necessary to wait thirty days after the piles are made before they can be driven, whereas most building owners are unwilling to undergo a delay of this kind after having let a contract for a structure.

The second portion of this paper covered the various types of built-in-place piles. This included the Raymond pile, consisting of a sheet metal shell, driven by a mandrel, which is filled with concrete after the mandrel has been withdrawn. These piles have been in use since 1903. The Simplex pile was also described, which consists of a stiff steel shell driven by a hammer and then withdrawn as the concrete is placed. The developments through which these various types have passed were described in connection with a discussion of the effect of subsequent driving on piles of this type already in place.

Officers of the Association elected for the coming year are president, Prof. William K. Hatt, Purdue University, Lafayette, Ind.; vice-president, Sanford E. Thompson, consulting engineer, Boston, Mass.; treasurer, R. W. Lesley, consulting engineer, Philadelphia; directors, for two years, Ernest Ashton, Lehigh Portland Cement Company, Cincinnati, Ohio; William P. Anderson, Ferro-Concrete Construction Company, Cincinnati; Ernest McCullough, Portland Cement Association, Chicago, Ill.

THE CEMENT SHOW

The tenth Chicago Cement Show was held February 7 to 15 inclusive in the Coliseum, being concentrated this year in the one building by making full use of the balcony and the Annex for exhibit purposes. A total of 179 firms exhibited. As in the case of the recent cement shows, the exhibit was designed for the interest of the contractor and building owner rather than the general public. This was illustrated in the Joint Educational Exhibit of the Portland Cement Companies which was concerned principally with object lessons in the production of good concrete. Machinery formed the greatest single group of products on display, the entire annex being occupied by the exhibit of the National Association of Mixer Manufacturers.

LEGISLATION AFFECTING RAILWAYS

The following bills and resolutions affecting railways have been introduced in Congress:

Senator Wadsworth on February 8 offered an amendment to the agricultural appropriation bill to amend the law requiring railroads to unload livestock after 28 hours, to provide that livestock shall be unloaded, rested and fed for not less than five hours nor more than 12 hours, except on the consent of the owner or shipper. The amendment was objected to on a point of order, but later in the day Senator Newlands introduced a bill, S. 8188, in a form recommended by the Secretary of Agriculture intended to accomplish the same purpose, i. e., to prevent undue detention of livestock after it has been unloaded. The bill was referred to the Committee on Interstate Commerce. Senator Newlands' bill provides that all way-bills or other memoranda issued for the shipment of livestock shall have marked or stamped on the face thereof the exact time of the completion of the loading at the original station, and of the beginning of each unloading, and of the completion of each reloading of the animals if they are unloaded en route for feeding, water and rest, and it shall also bear a notation showing whether a request has been filed extending period of confinement to 36 hours. These shall be kept in permanent and accessible form and the Secretary of Agriculture is authorized to employ inspectors or special agents to inspect and examine them. The committee has announced a public hearing on the bill for February 23.

Senator Newlands on February 10 offered an amendment to the rivers and harbors bill, providing for the appointment of a waterways commission consisting of the Secretary of War, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce and three additional members to be appointed by the President, to bring into co-ordination and co-operation the engineering, scientific and constructive services of the various government departments and commissions that relate to study, development or control of waterways and water resources and subjects related thereto, including the regulation of navigation as a part of interstate and foreign commerce and co-operation of railways and waterways. This commission is to report to Congress as early as practicable a comprehensive plan or plans for the development of waterways of the United States. Senator Newlands announced his intention to urge this plan of organization as a substitute for that of the flood control bill.

S. 8201, was introduced by Mr. Newlands on February 8 and referred to the Committee on Interstate Commerce, to amend the mediation and conciliation act of July 15, 1913; to authorize the President to protect the operation of trains in time of peace and to take possession of the common carriers and draft their crews and officials in time of war and for other purposes. Reported favorably by Committee on Interstate Commerce on February 10. (See Washington Correspondence).

S. 8191 was introduced by Mr. Thomas on February 8 and referred to the Committee on Interstate Commerce. It provides for the enlargement of the Interstate Commerce Commission to 14 commissioners and one chief commissioner, by the appointment of additional members by the President for terms of four years. It authorizes the chief commissioner to distribute the work of the commission among five departments, each of which shall have all the powers of the whole commission and issue decisions, orders or rules subject to the right of any party to any proceeding to a rehearing upon satisfactory cause shown by verified petition to the commission in bank.

The commission is given power to revise and reconstruct tariffs of rates, fares and charges and to formulate and put in force entirely new tariffs, either when an increase is proposed by carriers or at any time upon the initiative of

the commission or upon complaint. Whenever the commission shall deem it necessary or shall find it convenient in order to prevent discrimination or to equitably equalize rates, it may increase as well as reduce a rate and rearrange and newly create classifications. In determining rates the test of reasonableness and justice shall be in conformity to the requirements declared by the Supreme Court of the United States in Covington & Lexington Turnpike Co. v. Sanford.

In order that the commission may have constantly before it for emergencies the means for satisfying an important test of rates, it is required to proceed forthwith to the appraisement and valuation of the properties of at least 10 of the leading and dominating railroad systems, the commission to make the valuation according to its best judgment with a view to most effectually accomplishing the object. The valuation shall be only of the property used in transportation and the commission shall reject any value or claim of value of franchises or good-will, but shall include all accessions of value derivable from improvement of the vicinage, whether such value resulted from the construction of railroads to the place or places of location or otherwise. In the case of terminals and stations, the land and improvements shall be separately ascertained and the presence in the town or city of the particular railway and the additional value given to land by its presence and by general transportation facilities shall be considered and such value given to the land as if it were available for residential or business uses. The original cost of structures after a deduction for depreciation shall constitute their valuation. The rights of way shall be valued according to the use to which they might be devoted if not occupied for railroad purposes.

H. R. 20844 was introduced by Mr. Keating on February 9 and referred to the Committee on Interstate and Foreign Commerce. It aims to establish a United States commission of mediation and conciliation for the purpose of investigating the relations between railroads and their employees and for other purposes. It provides for the creation of a new commission to be appointed by the President, consisting of two men who have had practical experience in the operation of railroads as officials and two who have had practical experience in the operation of trains as employees and who are brotherhood members, to be paid salaries of \$10,000 a year.

It shall be the duty of the commission to study the relations between common carriers and their employees and to publish from time to time data and information relating to such questions, and whenever a controversy arises between a common carrier and a brotherhood the commission may, of its own motion and shall at the request of either party, make investigation and within 10 days after the close of such investigation make a report of its findings and recommendations. If such recommendations are not accepted by both parties within five days the commission shall transmit its report and recommendations to the President and cause it to be made public. It provides for the transfer of the records, papers and property of the United States Board of Mediation and Conciliation to the new commission.

A joint resolution has been introduced in both houses of Congress providing for the appointment of a joint committee of Congress to examine into existing conditions in the territory of Alaska relating to matters of legislation and appropriations concerning the developments and government thereof, including the construction and operation of government railroads. The resolution has been reported favorably in the Senate by the Committee on Territories.

Senator Overman, chairman of the Senate Judiciary Committee, has appointed a sub-committee consisting of Senators Chilton, Fletcher and Nelson to consider the bill introduced by him to amend the provisions of the Clayton law applying to railroad purchases and also the resolution postponing the effective date of this section of the law until January 8, 1918.

H.R. 20830, introduced by Mr. Hulbert February 8, was

referred to the Committee on Interstate Commerce. It prohibits the construction of bridges and construction of additional tracks upon existing bridges over any navigable stream in the city of New York unless the elevation at mean high water shall be sufficient to permit the free movement of such vessels as are ordinarily operated upon such streams.

GOVERNMENT ACCIDENT BULLETIN NO. 60

The Interstate Commerce Commission has issued within the past week accident bulletins Nos. 58 and 59 containing a record of railway accidents in the United States during October, November and December, 1915, and January, February and March, 1916, respectively, and also bulletin No. 60, giving the record for April, May and June, 1916, and for the fiscal year ended June 30, 1916. From the annual summary it appears that the number of persons killed in train accidents during the fiscal year was 549 and of injured 7,473; which figures include 141 passengers, 313 employees and 95 other persons killed and 3,850 passengers, 3,412 employees and 211 other persons injured. The total of killed, all causes, is 9,364, and 180,375 were injured; an

Employees on duty—Continued:

Overhead obstructions, etc.	59	1,310	45	1,083	89	1,490
Falling from cars, etc.	384	12,196	368	10,748	497	14,563
Other causes	1,102	23,374	870	20,865	1,314	27,273
Total	1,972	42,426	1,594	38,060	2,523	50,841
Total passengers and employees	2,255	50,805	1,816	50,170	2,788	65,962
Employees not on duty	301	726	215	840	327	1,097
Other persons not trespassing:						
In train accidents	11	92	7	110	9	148
Other causes	1,464	4,347	1,156	5,280	1,298	5,827
Total	1,475	4,439	1,163	5,390	1,307	5,975
Trespassers:						
In train accidents	84	119	88	161	75	178
Other causes	4,763	4,990	4,996	6,287	5,396	6,176
Total	4,847	5,109	5,084	6,448	5,471	6,354
Total in accidents involving train operation	8,878	61,079	8,278	62,848	9,893	79,388
Nontrain accidents	486	119,296	343	99,192	409	113,274
Grand total	9,364	180,375	8,621	162,040	10,302	192,662

Table 1b in the report gives a classification of the casualties to passengers, employees and other persons by causes.

TABLE NO. 2—COLLISIONS AND DERAILMENTS—YEARS ENDING JUNE 30

Classes	1916					1915					1914				
	Number of persons—		Damage to road and equipment and cost of clearing wrecks			Number of persons—		Damage to road and equipment and cost of clearing wrecks			Number of persons—		Damage to road and equipment and cost of clearing wrecks		
	Number	Killed	Injured	Number	Killed	Injured	Number	Killed	Injured	Number	Killed	Injured	Number	Killed	Injured
Collisions:															
Rear-end	632	94	1,139	\$791,800	435	26	833	\$502,578	815	80	1,671	\$988,388			
Head-on	368	82	1,377	681,800	282	65	1,265	439,794	484	100	1,966	817,518			
Broken-train	330	4	38	151,400	303	3	77	131,541	397	7	94	175,499			
Miscellaneous	3,440	72	1,306	1,549,000	2,518	40	1,318	1,078,853	3,545	99	2,145	1,793,874			
Total	4,770	252	3,860	\$3,174,000	3,538	134	3,493	\$2,152,766	5,241	287	5,876	\$3,775,279			
Derailments due to—															
Defects of roadway	1,673	28	921	\$1,194,800	1,507	43	1,540	\$1,120,583	1,888	66	1,987	\$1,516,343			
Defects of equipment	4,073	47	476	3,420,200	3,416	54	766	2,648,133	4,186	50	1,074	3,358,088			
Negligence of trainmen, signalmen, etc. ¹	675	27	334	512,700	297	20	304	176,453	426	19	461	314,065			
Unforeseen obstruction of track, etc.	318	102	621	589,900	244	60	484	320,190	318	52	439	410,268			
Malicious obstruction of track, etc.	75	7	68	100,700	70	12	137	202,682	58	14	155	87,985			
Miscellaneous causes ²	1,090	47	634	1,026,800	1,315	59	830	1,180,091	1,689	117	1,445	1,503,153			
Total	7,904	258	3,054	\$6,845,100	6,849	248	4,061	\$5,648,132	8,565	318	5,561	\$7,189,902			
Total collisions and derailments	12,674	510	6,914	\$10,019,100	10,387	382	7,554	\$7,800,898	13,806	605	11,437	\$10,965,181			

¹ Figures for the year 1916 include 365 derailments in which 15 persons were killed and 182 injured, resulting in damage to the amount of \$326,100, of a class previously assigned to "Miscellaneous causes."

² See Note 1.

increase over 1915 of 743 killed and 18,335 injured. The figures for the year are summarized in Table 1 as follows:

TABLE NO. 1—CASUALTIES TO PERSONS—YEAR ENDING JUNE 30

Class	Passengers and persons carried under contract		Employees (including employees not on duty)		Other persons (trespassers and nonpassengers)		Total persons	
	Kil'd	Inj'd	Kil'd	Inj'd	Kil'd	Inj'd	Kil'd	Inj'd
<i>Train accidents</i>								
Collisions	84	2,143	145	1,660	23	57	252	3,860
Derailments	57	1,671	133	1,255	68	128	258	3,054
Miscellaneous, incl. boiler explosions	36	35	497	4	26	39	559	
Total	141	3,850	313	3,412	95	211	549	7,473
<i>Train-service accid'ts</i>								
142	4,529	1,960	39,740	6,227	9,337	8,329	53,606	
Total	283	8,379	2,273	43,152	6,322	9,548	8,878	61,079
<i>Nontrain accidents</i>								
...	...	414	117,511	72	1,785	486	119,296	
Grand total....	283	8,379	2,687	160,663	6,394	11,333	9,364	180,375

Table 1c gives comparisons with two preceding years as follows:

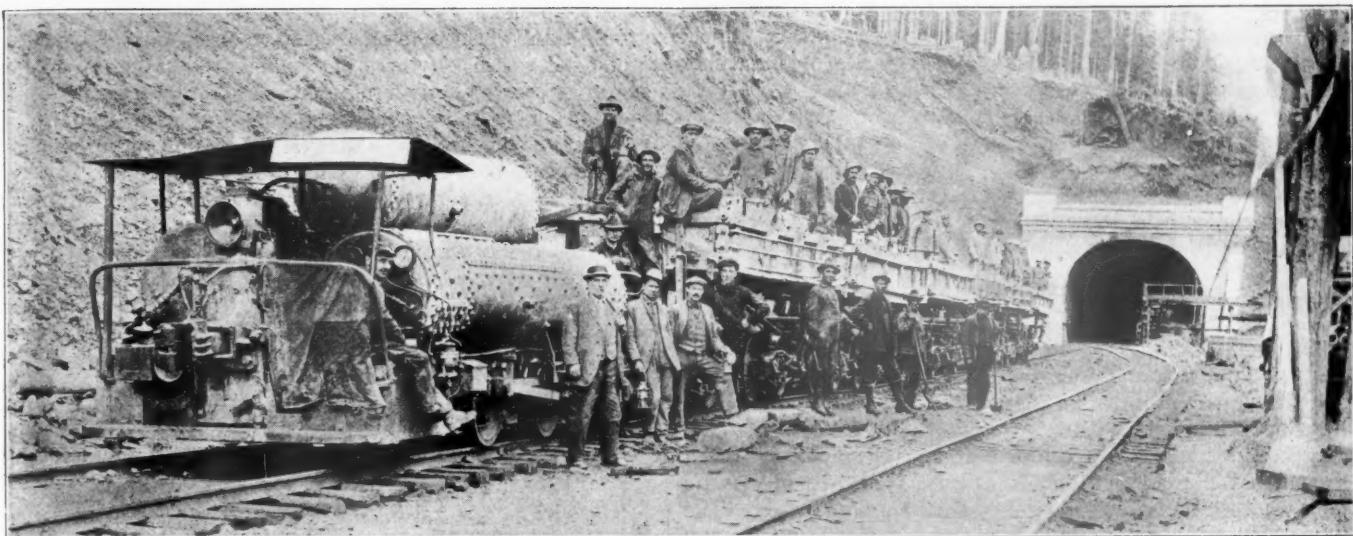
TABLE NO. 1C—SUMMARY OF CASUALTIES TO PERSONS—YEARS ENDING JUNE 30

Item	1916		1915		1914	
	Killed	Inj'd	Killed	Inj'd	Killed	Inj'd
<i>Passengers:</i>						
In train accidents	141	3,850	89	4,648	85	7,001
Other causes	142	4,529	133	7,462	180	8,120
Total	283	8,379	222	12,110	265	15,121
<i>Employees on duty:</i>						
In train accidents	304	3,352	221	3,371	452	4,823
In coupling accidents	123	2,194	90	1,993	171	2,692

Table No. 2 shows that the total number of collisions and derailments reported for the year was 12,674, composed of 4,770 collisions and 7,904 derailments. The damage to roadway and equipment and the cost of clearing wrecks resulting from these accidents amounted to \$10,019,100. The bulletin gives the usual voluminous tables classifying casualties in great detail and reports of investigations of accidents made by the inspectors of the commission.

Electric railways reporting to the commission (not included in the foregoing statistics) had a total of 446 persons killed during the year and 4,574 injured; and there were 204 train accidents, including 121 collisions and 56 derailments. Train accidents are charged with 15 fatalities and 812 injuries. The total number of passengers killed from all causes was 25 and of employees 37; while 131 trespassers were killed.

BRIDGE BETWEEN SWEDEN AND FINLAND.—A bridge nearly a mile long is being built by the Russian and Swedish governments over the River Tornia, which separates Sweden and Finland at the apex of the Gulf of Bothnia. The Swedish government is doing the actual work, having better access to material. By this bridge the railway system of the two countries will be united, and one may then be able to travel from Stockholm to Vladivostok without alighting from the railway coach.



Compressed-Air Locomotive and a Train of Muck Cars

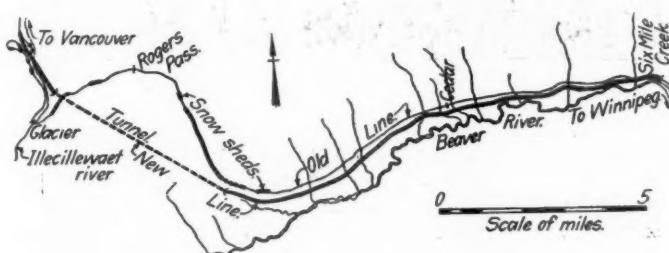
The Longest Railway Tunnel in America

Recently Completed Five-Mile Bore of the Canadian Pacific in the Selkirk Mountains was Built in 3½ Years

ON December 9 a double track tunnel five miles in length, the longest railroad tunnel in America, was placed in service by the Canadian Pacific. This tunnel which passes under Mount Macdonald in the Selkirk mountains of British Columbia, has been named the Connaught tunnel in honor of the former governor-general of Canada. It is in many ways a most notable piece of

the completion of 7 miles of double track railroad and the elimination of $4\frac{1}{2}$ miles of snow sheds. More important, this was rapidly becoming a point of serious congestion and double track was necessary. This made the undertaking of this heavy work advisable rather than committing the road definitely to the old location through the pass by double tracking it. The elimination of snow sheds is also one of the most important gains, as the Canadian Pacific in common with other roads west of the Rocky mountains has found these structures an item of heavy maintenance expense while introducing a serious fire hazard. Moreover, the conditions which make them necessary on any line involve a liability which the sheds cannot entirely eliminate.

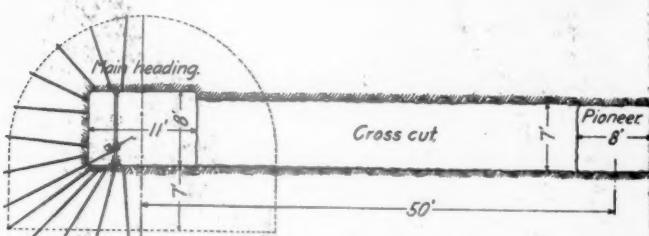
The transcontinental line of the Canadian Pacific crosses



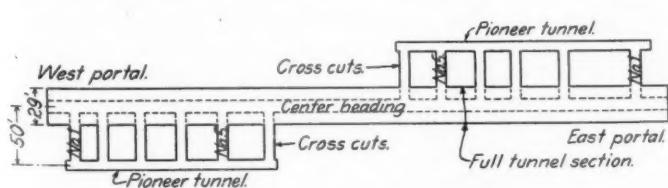
Location of Old and New Lines at Rogers Pass

work. Its successful completion demonstrated the practicability of a new method of tunneling, whereby rates of progress were obtained much in excess of previous records.

This project is noteworthy from the standpoint of its economic justification. It involved an expenditure of approximately \$6,500,000 for improvements which do not reduce



Cross Section of Main and Pioneer Tunnels



Arrangement of Main and Pioneer Tunnels

the ruling grade or eliminate pusher service. The objects attained by the expenditure of this sum include savings of 4.3 miles of distance, 552 ft. of rise and fall, 2,600 deg. of curvature, a reduction in the length of the east and west approach pusher grades of 9 miles and 8 miles respectively,

the Selkirk mountains at Rogers Pass at an elevation of 4,300 ft. However, the country traversed is very rugged, grades of 2.2 per cent being required in making the climb from both the east and the west. The east approach is 21 miles long and that on the west 25 miles, and both occupy narrow canyons for the entire distance. As indicated by the map and profile the tunnel project involves a change of line 10.27 miles long, most of which is east of the tunnel where the new location is supported on a bench at a lower level on the north side of the Beaver River canyon. The saving in distance is almost entirely west of the summit where two spiral loops on the old line are eliminated. Other features involved in the improvement are a six-track yard just west of the tunnel and three short girder bridges. A complete account of the physical characteristics of the new

and old lines and a description of the operating arrangements were given in a preliminary article on this project which appeared in the *Railway Age Gazette* of December 11, 1914, page 1082.

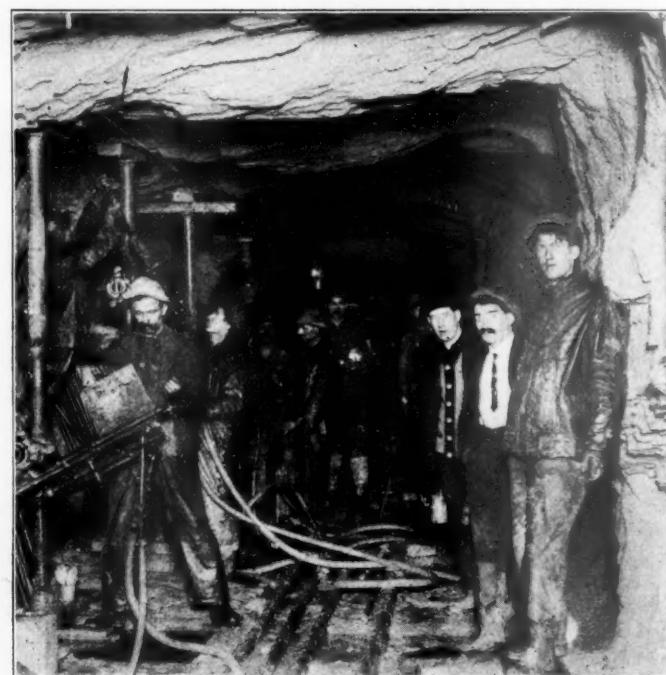
The tunnel is 26,512 ft. long and provides for two tracks spaced 13 ft. center to center, with horizontal clearances of 8 ft. from the center of the track and vertical clearances of 20 ft. above the base of the rail measured on the center lines of the tracks. The grade through the tunnel is 0.95 per cent ascending westward, with the summit a short distance inside of the west portal.

THE TUNNELING METHOD.

During the years just preceding the inception of the tunnel project, the traffic on the Canadian Pacific was increasing with great rapidity and there was every indication that the line would require double track at an early date. Because of this, the rapid completion of the tunnel was most urgent and studies were made to devise a method of driving that would be most effective in advancing the work. The tunnel location is through a mountain which rises almost abruptly from each portal and reaches an elevation of about 6,000 ft. over the roof. There was, in consequence, no opportunity to utilize shafts for the driving of intermediate headings and work was restricted to operations advancing from each portal.

To meet this condition the plan adopted involved the use of an auxiliary or pioneer heading entirely outside and independent of the tunnel proper, of a cross section as small as could be worked satisfactorily and which was driven at maximum speed. From this pioneer heading, drifts or cross cuts were driven at intervals to the center line of the main tunnel, thereby affording numerous points from which advance center headings could be driven in the tunnel proper. However, the real function of the pioneer tunnel was to pro-

the west pioneer was 128 ft. above grade and also materially out of line, while that of the east pioneer was 43 ft. above grade. As seen on the profile, the grades on the pioneer headings were adjusted to place the bore in the standard position in as short a distance as possible, a grade of 50 per cent being used in the west pioneer for this purpose. The interval between cross cuts varied from 1,500 to 3,000 ft., six cross cuts being driven from each of the temporary tunnels, but the latter were not driven to a point of meeting but were discontinued at the sixth cross cuts, which were almost exactly one mile apart. It was calculated that the advance headings could be driven for this distance and that the drilling for the enlargement of the tunnel could be completed before the blasting operations would pass the last



Drilling for the Enlargement



A Typical Heading Gang

vide a means for the transportation of the muck from the various headings and for the carrying of air, water and ventilating pipes, that would be entirely undisturbed by the blasting and power shovel operations incident to the enlargement of the main tunnel to full size. A discussion entering fully into the selection of this tunneling method was given in an article by J. G. Sullivan, chief engineer of the Canadian Pacific, Western Lines, which appeared in the *Railway Age Gazette* of May 12, 1916, page 1044.

The pioneer tunnels run from each end were 7 ft. high by 8 ft. wide and were normally 50 ft. to the right of the center line of the main tunnel with the bottom 7 ft. above sub-grade. This standard position was modified at the portals to shorten them as much as possible. The mouth of

cross cuts and thereby disturb work within the limits of this mile of center heading. Under this assumption any further extension of pioneer headings would be an unnecessary expense. These calculations proved correct.

THE MATERIALS ENCOUNTERED

For a distance of 1,200 ft. from the east end and 400 ft. from the west end the tunnel passes through loose debris consisting of disintegrated rock, loose rock and earth. Inside these limits the tunnel is entirely in solid rock. This consists of several varieties of chert with occasional seams of quartzite and a few seams of pure quartz of a maximum thickness of one foot. Because of the great overburden there were naturally some conjectures as to the possibility of pressure conditions, such as have caused much trouble in some of the great European tunnels. It was also suggested, as an objection to the method of tunneling adopted, that the presence of the smaller tunnel at one side created an eccentricity which would be a source of trouble under the enormous loading. These fears proved groundless. No physical evidence of pressure became manifest except in hard rock sections such as quartzite where the tunnel men complained of rumbling or crushing noises, but these ceased after a time without further signs of pressure. Shooting for the enlargement of the tunnel proper occasionally caused some rock falls in the pioneer tunnel adjacent, but no other consequences of the proximity of the two bores were noted.

Most of the rock encountered was of a character that re-

quired no lining but there were several locations where dangerous rock falls occurred or where the rock proved to be of a character that it disintegrated upon exposure to the atmosphere. In consequence, such sections were provided with a concrete lining such as was used for the earth and loose rock sections at each end of the tunnel.

CONSTRUCTION METHODS.

The driving of the tunnel through the debris section at each end called for the use of a crown heading with side drifts and full timbering. The details of the method of prosecuting this work were given in the first of the articles referred to above.

The headings in the rock sections were worked ordinarily by a crew of 11 men consisting of 3 drillers, 2 helpers, 5 muckers and 1 nipper, working in three 8-hour shifts per

drillers and muckers to work simultaneously with the least loss of time.

The muck was shoveled by hand from steel plates, upon which it was thrown by the blast, into $\frac{1}{2}$ cu. yd. dump cars handled either by mules or by a small compressed-air locomotive. Material from the pioneer heading was carried back along the pioneer tunnel to the first cross cut behind the point where the main tunnel was enlarged to full section. Here it was hauled out on a trestle extending at right angles across the tunnel proper from which it was dumped into standard-gage muck cars standing on tracks at the sub-grade below. Muck from the advance heading was taken into the pioneer tunnel through the first cross cut to the rear and then followed the same route as the material from the pioneer heading.

The enlargement of the tunnel to full size was accomplished by shooting holes drilled radially in a plane perpendicular to the axis of the tunnel. Twenty-six holes were drilled in each plane using a drill mounted on a column as shown in one of the accompanying photographs. In the earlier work on the tunnel a complete ring of these holes were drilled every six feet along the tunnel, but when the price of explosives advanced materially it was decided to drill the holes at intervals of five feet instead of six and to use less explosive. This proved so much more economical that the practice was continued until the work was finished.

The enlargement was carried on progressively from the two portals. As many as fifteen drills were used for this purpose at one time. This work was kept sufficiently in advance of the shooting and mucking so that the air and water lines could be conducted into a cross cut and not be interfered with by the blasting. The mile of advance heading between the ends of the last cross cuts from the pioneer tunnels was drilled for enlargement complete before any shooting was done within those limits.

The shooting was done as far as possible in advance of the shovel that removed the muck, being discontinued when the section became completely choked with muck. The holes in the lower half of the section were shot in advance of those in the upper half. It was necessary to have the shovels clear out all of the muck before starting another series of shots because the bottom of the tunnel next to the face was frequently left high by the blast. It was necessary to correct this before proceeding by loading a few extra holes drilled in front of the face by jack hammers.

PLANT AND EQUIPMENT

Complete construction camps were erected at each portal. These included power plants for the supply of compressed air, water and electric lights, and heat for the camp buildings in winter time. Each power plant contained three compressors, having a combined capacity of 4,500 cu. ft. of free air per minute working to a pressure of 125 lb. per sq. in. to supply air to the drills. Two high-pressure compressors were also installed, having a combined capacity of 1,500 cu. ft. of free air per minute to a pressure of 1,100 lb. per sq. in. for use in compressed air locomotives. Steam was supplied by five 150-h.p. return-tube boilers.

Four Porter compressed air locomotives were used at each end of the tunnel. At the west end, where the material was hauled up hill, three 15-ton standard-gage locomotives were employed in handling 12 cu. yd. Western steel air-operated dump cars. These cars were loaded by a steam shovel with the muck from the enlargement of the tunnel and with the material dumped from the heading cars. At the east end of the tunnel where the loads travelled down hill three 10-ton locomotives were used in similar service. In each pioneer tunnel a 5-ton air locomotive was used on an 18-in. gage track to haul small muck cars from the headings, but these locomotives were supplemented to a large extent by mules. Ingersol-Leyner drills were first



Trimming Out the Tunnel Section with a Stope Drill

day. The men operating locomotives or driving the mules hauling the muck worked in two 12-hour shifts, from one to three men being employed per shift per heading as required by the length of the haul.

Three drills were used simultaneously, mounted on a horizontal bar, first in a position to drill all the holes in the upper half of the face and then in a lower position to reach the remaining holes. In the pioneer heading, 24 holes were driven in hard rock and 21 in soft. In the advance heading, which was 8 ft. high by 11 ft. wide and located centrally in the full tunnel section, 28 holes were drilled in hard rock and 26 in soft. An advance of 6 to 7 ft. was made per shot. The drills were always used in the upper position of the bar first while the muckers were busy clearing away the muck below. This enabled the large extent by mules. Ingersol-Leyner drills were first

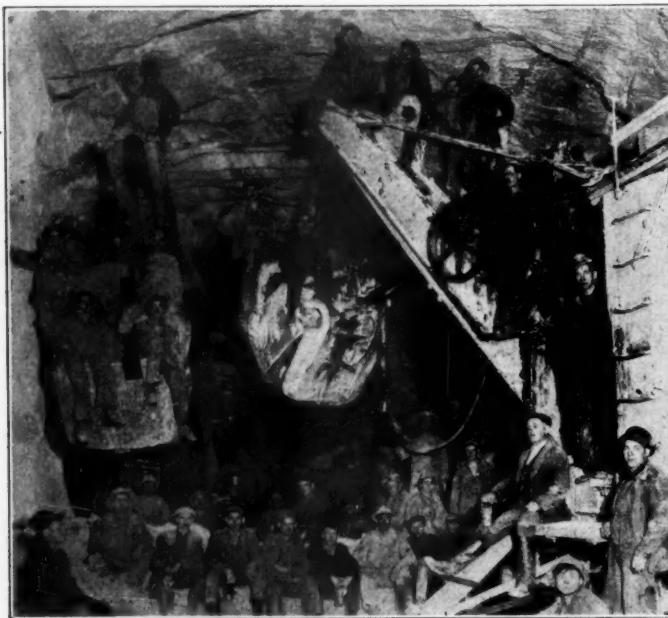
used in both heading and in the enlargement, and later Dreadnaught drills were employed.

Another purpose for which the pioneer tunnels proved useful was for the delivery of air for ventilating the tunnel. The air, supplied by a Connersville ventilating fan having a capacity of 3,000 cu. ft. per minute, was carried back to the most remote cross cut through which the air could be conducted and secure circulation back through the main tunnel. Ventilation in the blind ends of the advance and pioneer headings was furnished by auxiliary fans set up in the pioneer tunnel to exhaust air from the headings through a 12-in. wood stave pipe.

PROGRESS AND RECORDS

The contract for the construction of the tunnel was let on July 1, 1913, on a percentage basis, with the date of completion set for January 1, 1917. An allowance of one day was made for every 10 ft. of soft ground encountered, and as there was 1,660 ft. of such ground, the date for the completion of the tunnel was virtually set ahead to June 1, 1917. The contract provided a bonus in case the work was done at a cost less than it would have cost at the unit prices which the contractors had tendered. A value was also placed on each day that the tunnel would be completed in advance of the date fixed. The contractor in turn established a bonus system of payment for the men which applied to all classes of labor in which additional effort could influence the rate of progress.

In the headings the gang was the unit. Payment was based on a combination of day rate, piece work rate and



Meeting of the Shovels

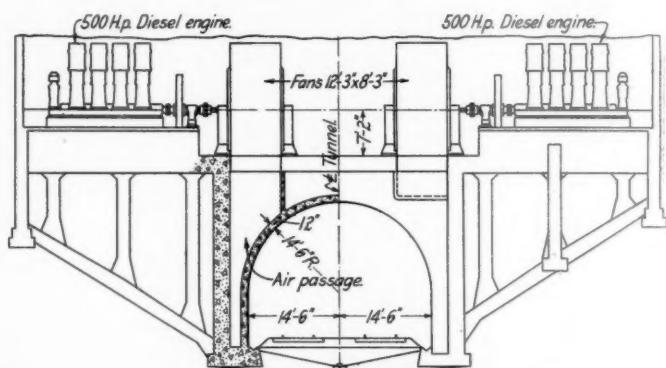
bonus. In addition to a day's wage, each man received a specified portion of a piece work payment given to the gang as a whole for the number of lineal feet of heading completed. This piece work rate was \$2 per foot in the advance heading and \$1.50 per foot in the pioneer heading. In any month in which the total lineal feet of heading completed by the gang exceeded 450 ft., it received additional compensation equal to \$5 for each foot that the total progress exceeded 450 ft. The above rates were based on tunneling in schist, all quartz or quartzite encountered being calculated on the basis of one foot of quartzite equal to 1½ ft. of chist.

For the drilling in the enlargement, drillers were paid \$3.20 per eight-hour shift and helpers \$2.80. On the basis of 64 ft. of hole as a day's work, drillers received \$.05 and

helpers \$.03 for each foot in excess of that amount completed in each shift. In the case of the steam shovel work for the removal of the muck from the enlargement 750 ft. of tunnel was established as a standard month's performance with a bonus to the shovel and train crews for each foot of excess completed per month.

In general this system was very successful in securing the maximum effort from the men. The gang system was no less successful than the payment of individual premiums, as the members of the gangs took it upon themselves to eliminate any lazy or incompetent men who were holding back the gang output.

The maximum progress in the pioneer tunnel was 932 ft., and was obtained in the west heading in the month of January, 1915. The shovel work, which governed the rate of speed in the enlargement, was gradually increased until an average rate of 30 ft. per day per shovel was maintained for three months. On the basis of two shovels, this is



Section Through the Ventilating Plant

equivalent to the completion of four miles of tunnel per year. The west shovel, where the trains worked against the adverse grade, made better progress than the east shovel. The former finished 1,030 ft. in March, 1916, 1,000 ft in April and 986 ft. in May.

The east pioneer heading was started on August 4, 1913, and was completed on July 26, 1915, a distance of 10,740 ft., or at the average rate of 15 ft. per day. The west pioneer heading was started May 8, 1914, and completed on July 25, 1915, a distance of 8,870 ft. at an average rate of 20 ft. per day. Work on the full section was started on the east end January 15, 1914, and on the west end on June 18. The work in the earth section was slow and it was not possible to start regular advance headings in the rock in the east end until April 26, 1914, and in the west end until August 4, 1914. These headings met in the center of the tunnel on December 19, 1915, although there still remained 268 ft. of center heading to connect up in the east half of the tunnel between the fifth and sixth cross cuts. This was finally holed through January 2, 1916. The east shovel started July 26, 1914, and the west shovel November 30, 1914. They came together in the tunnel on July 7, 1916.

THE CONCRETE LINING

The tunnel was provided with a concrete lining for a total distance of 7,837 ft. About 1,200 ft. of this was for the timbered loose rock section at the two ends of the tunnel, and the remaining portion for those sections of the tunnel where the rock was of the character requiring covering, as explained previously. The lining extended in from the west portal for a distance of 5,917 ft., and from the east portal 1,305 ft. Six intermediate points required an aggregate of 615 ft. of lining. The inside contour of the lining is the same in both the rock and the timbered sections, no invert being used in either case. A simple wall footing was set

to sub-grade with a 6-in. offset from the neatwork line on the inside. In the timbered portion and in the bad rock section the minimum thickness of the lining is 2 ft. 6 in. Where the rock was found to be in better condition a minimum thickness of 15 in. was permitted in the side walls. Where overbreaks in the rocks gave a distance between the neat face of the lining and the rock much in excess of the allowable minimum thickness, the lining was concreted to standard thickness with an outside form which was not recovered and the space between the form and the rock was backfilled with muck and debris to the level of the springing line. Above that level the space was packed with cord wood. Payment for the lining work done by a sub-contractor was on the basis of separate unit prices for concrete, back-filling and cord wood packing, the relative thicknesses of concrete and back-filling or packing spaces being determined by the inspector. Based on the quantities for 2,500 ft. of rock section, the average quantities per lineal foot of lining were 4.38 cubic yards of concrete, 0.544 cords of wood packing and 0.379 cubic yards of rock filling.

In the rock section the arch was reinforced with $\frac{3}{4}$ -in. circumferential rods placed concentrically 12 in. center to center. One-half inch longitudinal rods were placed 2 ft. 6 in. center to center. Dowels united the side walls to the arch. The lining of the timbered section was reinforced throughout with $\frac{3}{4}$ -in. circumferential rods 12 in. center to center, adjacent to both faces of the lining. The longitudinal rods are the same as in the rock portion.

The forms consisted of timber ribs placed 4 ft. center to center and 16-ft. lagging assembled in widths of 3 ft. by means of cleats except that for the keying of the arch, 4-ft. lagging was used for a width of 2 ft. 6 in. at the crown to permit placing it in short sections as the concrete was shoveled and rammed into place to key the arch. The arch ribs were secured in place by anchor bolts set in the rock, 24 being used for each 16 ft. of the tunnel. Wires from these bolts were secured to lines of 6-in. by 8-in. wales.

All of the lining at the east end and 2,300 ft. at the west end of the tunnel was put in place from mixing plants located outside of the tunnel. The remainder of the lining was concreted from a mixer plant on cars that was moved from point to point as the work progressed. The mechanical features of this plant included only the mixing and delivering of the materials to and from the mixer. The concrete was placed by hand from a platform supported by the form work at a level of 15 ft. 8 in. above sub-grade.

The mixing plant consisted of three distinct features, the hopper cars, the mixer car and the incline car. The hopper cars supplied the gravel which was deposited in a small car running on a track on the floor of the cars underneath the hoppers. This gravel car carried the material to the mixer car which contained a complete plant for the proportioning, mixing and discharging of the concrete. The purpose of the incline car, which consisted of a flat car upon which an inclined track had been built, was to transfer a concrete buggy with its load of concrete from the track level to a track on the elevated platform supported by the forms as described above. Both concrete and material cars were operated by cables from the drums of hoisting engines located on the mixer car.

To facilitate the delivery of concrete a 32-ft. length of traveling platform supported on trucks was installed on the fixed platform and moved along on the latter as the work progressed. This supplementary platform was equipped with a track on the center line elevated about 3 ft. save for an incline at one end to connect with the track on the platform proper. Along each side of this track and extending to the side walls, inclined aprons were installed on which the concrete, dumped from the cars, was scraped

into the side wall forms, or picked up in shovels to be thrown back on the arch forms.

Ordinarily the concrete crew worked a single 10-hour shift during the day time. Night work consisted of back-filling and packing, carpenter work on the forms and preparation of the mixing plant for the next day's run. A day's supply of cement was piled on the roof of the concrete car. Forms for 400 ft. of tunnel were usually in place at one time and 48 ft. of completed side wall was kept in advance of the arch to permit the erection of arch centers.

Sixteen men were commonly employed on the platforms to deposit the concrete. Work was concentrated on an arch section, placing the lagging as the level of the concrete rose. As the crown was closed up and the work slowed down the concrete could not be placed as fast as the mixer could furnish it. Consequently, a portion of the crew was diverted to place the surplus concrete in the side walls, while the remaining force completed the keying of the arch. The crew on the mixing plant consisted of 15 or 16 men. In the absence of traffic in the tunnel it was possible to carry on this work to good advantage and the progress was rapid. In ten consecutive days an average of 200 cu. yd. of concrete was placed per shift.

THE VENTILATING SYSTEM

A decision to operate through the tunnel with steam power implied the installation of a high-power ventilating plant. This has been provided at the up grade or west portal to force air against the ascending trains, thereby blowing the smoke back over the train. It is not used for trains descending the grade. A duplicate plant is provided, consisting of two Multi-blade fans furnished by the B. F. Sturdivant Company, Galt, Ont. These have fans 12 ft. 3 in. in diameter by 8 ft. 3 in. wide, capable of delivering together 700,000 cu. ft. of free air per minute at a temperature of 70 deg. F. They have $\frac{7}{8}$ -in. housings and two ring-oiled self-aligning bearings. Power is supplied by two 4-cylinder, 4-cycle, 500-h.p. Diesel engines manufactured by McIntosh and Seymour, Auburn, New York. Each engine weighs 156,000 lb. and operates at 190 r.p.m.

The engines are direct-connected to the fans and to a three-stage air compressor, compressing to from 850 to 900 lb. per sq. in., and supplying air to two receivers of 11 cu. ft. capacity each. This air is used to start the engines which operate on a cylinder compression of 460 lb. per sq. in. An auxiliary air storage bottle of 3 cu. ft. capacity is provided for the injector equalizer. These engines burn California crude oil, the same as is used on locomotives of the Canadian Pacific between Field and Vancouver.

TRACK WORK

The laying of the permanent track in the tunnel was simplified by the presence of the contractor's standard gage track throughout the entire length. Tunnel rock was found unsuitable for use as ballast, so a pit-run gravel from Revelstoke, 43 miles west of the tunnel, was used. This was delivered in Hart ballast cars, and was handled into the tunnel from the uphill and by compressed air locomotives in two to six-car trains, the loads going down hill and being plowed off in the same direction. The ties and rails were handled in the same manner. All work was done by the contractor with a gang of about 100 men. Drainage of the road bed is afforded by an 8-in. tile drain located on the center line between tracks at sub-grade.

Auxiliary facilities in the tunnel include refuges in the sidewalls at intervals of one-quarter mile and a telephone every half mile. The tunnel telephone line and a $1\frac{1}{4}$ -in. cable for the regular telephone and telegraph circuits are carried in a wooden duct buried in the ballast on the center line between tracks.

A turntable is provided at each end of the tunnel to replace the turntable formerly in service at the old summit

at Rogers Pass. The heavy snowfall in this region introduces a problem in connection with these turntables which was solved at the east portal by placing the turntable on a high pier, and at the west portal by covering it with a steel frame house taken from the turntable at Rogers Pass.

The construction of the tunnel and the grade and line revisions of the approaches was under the direction of J. G. Sullivan, chief engineer of the western lines of the Canadian Pacific, and A. W. James, engineer of construction with H. G. Barber, as assistant engineer. The general contractor was Foley Bros., Welch & Stewart, Vancouver, B. C. Bates & Rogers, Chicago, were the sub-contractors for the tunnel lining. A. C. Denis, an officer of the general contractor, collaborated with Mr. Sullivan in devising the method used in driving the tunnel. The former originated the idea of the pioneer tunnel and the latter proposed the use of the permitted the shooting for the entire enlargement at one advance heading in the center of the main tunnel, which operation.

THE CHILLED IRON CAR WHEEL*

By George W. Lyndon

President, Association of Manufacturers of Chilled Car Wheels, Chicago.

The importance of the chilled iron car wheel to the transportation world is not fully recognized by the general public. The Interstate Commerce Commission reports that for the year ended June 30, 1914, there were 2,450,356 railway owned cars in service, which with approximately 225,000 cars in the service of the private car lines, gives a total of 2,675,356 freight cars. These cars carried approximately 288,319,890,210 tons of freight one mile, which, with 363,402,465,012 ton miles for the weight of the cars, gives a total ton-mile wheel load of 651,722,355,222.

An analysis of the rolling stock will show that 95 per cent of all freight cars are equipped with the chilled iron wheel; therefore, we have in commercial freight car service and company service and private car lines in the United States alone about 20,332,705 chilled iron wheels. Adding to this the chilled iron wheels under passenger cars, engine tenders and street car lines, the number of chilled iron wheels running today may be conservatively estimated as about 25,000,000. This represents 8,000,000 tons of metal, which at an initial cost of \$25 per ton amounts to \$200,000,000. Figuring the scrap value at \$15 per ton, the net cost is \$120,000,000. To replace these, 25,000,000 chilled iron wheels upon the basis of 2,500,000 annual renewals would require ten years. Thus, 800,000 tons of metal are used annually to provide for 2,500,000 wheel renewals. The association which I represent is made up of 25 manufacturers operating 50 plants throughout the United States and Canada, representing millions of invested capital and having a combined capacity of 20,000 car wheels per day.

INCREASES IN CAR CAPACITY AND WHEEL WEIGHTS

A 33 inch, 525 lb. chilled iron wheel of the Washburn type became standard soon after the year 1850 for 10-ton freight cars and also for passenger cars. Cars of this capacity remained standard for about 30 years. Under the conditions of light wheel loads, small flange pressures, slow speeds, low annual mileage, which prevailed during that time, the wheels would last the entire life of the car. Wheel mileage obtained under such circumstances is sometimes erroneously used to indicate the superior service of wheels manufactured at that time. The ton mileage, which is the true basis for comparison, was extremely low as compared with wheel performance at the present time.

The 30-ton car, introduced in 1885, was the heaviest

*Abstract of a paper presented to the Canadian Railway Club.

capacity car on any railroad during the time of the World's Columbian Exposition at Chicago in 1893. Its growth was very rapid on all railroads. A chilled iron wheel weighing 600 lb. was used under cars of this capacity and was recommended as standard in 1904 by the Master Car Builders' Association. It was later modified and the weight increased to 625 lb. in the year 1909, upon the recommendation of our association. It was not long before the 40-ton and 50-ton car were developed for the coal carrying trade and found to be so satisfactory that cars of lighter capacity ceased to be built for this service. The 700-lb. wheel was used under 50-ton cars and was recommended as standard in 1904 by the M. C. B. Association, but afterwards, upon the recommendation of our association, the weight was raised to 725 lb., and made standard in the year 1909. During the time intervening a new wheel was introduced of the rolled steel type and the steel wheel substituted for the 700-lb. chilled iron wheel weighed a minimum of 750 lb.

Cars of 70-ton capacity have already proven successful from every standpoint and are being made in comparatively large numbers at the present time.

Since the year 1875 the weight of the car structure has increased from 18,000 lb. to as high as 65,000 lb., or 260 per cent increase. The weight of rail has increased from 50 lb. to as high as 125 lb., or 150 per cent. The axle has increased from 350 lb. to 1,070 lb., or 200 per cent. The weight of the wheel has increased from 525 lb. to 725 lb., or 38 per cent. It will be noted that the percentage of increase in the wheel is much less than that for any other part of the car, and while the carrying capacity has increased from 10 tons to 70 tons, or 600 per cent, the weight of the heaviest M. C. B. standard wheel has increased only 38 per cent. The ton-miles per annum of the present 70-ton car is approximately 20 times that of the 10-ton car, which indicates the greater service given by the present wheel than was secured from any wheel during the pioneer days. It also plainly shows that the mere comparison of mileage is of no value unless the load carried is taken into consideration.

THE FLANGE

There is one part of the wheel that has received scant consideration and that is the flange. During all the remarkable railroad development the space between the running rail and the guard rail has remained fixed at $1\frac{3}{4}$ inches. The chilled iron wheel manufacturers have been trying for years to secure a stronger flange and have demonstrated the fact that 3-16 inch can be added to the thickness of the present M. C. B. flange by mounting each wheel 3-32 inch closer to the rail and still maintain the Master Car Builders' standard throat to back of flange dimension of 4 feet 6 29-64 inches. This insures that the relation of the back of the flange to guard rail remains the same as at present and no change in track clearance is required. We have received the approval of our plan from a special committee who were appointed for the purpose of investigation through the American Railway Engineering Association.

Under the 10-ton car, the weight of which was about equal to its capacity, the load carried per wheel was approximately 5,000 lb., which would require about 4,000-lb. flange pressure to change the direction of the truck in engaging curves. Under the 70-ton car the load per wheel has increased to 25,000 lb., which requires almost 20,000 lb. flange pressure to change the direction of the truck; therefore, the flange thrust has increased 400 per cent on account of the increased load, which is further augmented by the high speed of modern freight trains. Under present conditions of operation, considering the increased load and speed, the thrust on the flange including impact is at least 10 times greater than under the old 10-ton car; it must be apparent that the increased duty has not been provided for.

Tests made at the University of Illinois for the purpose of ascertaining the stresses to which the wheel is subjected in pressing it onto the axle and under service conditions, have shown that when a wheel is pressed on an axle a compressive stress is developed radially and a tensile stress circumferentially; that the plate must carry the load which produces a combination of stresses resulting in a wheel slightly elliptical; that on descending grades the heat generated by the brake shoe, which is a factor of load, grade and speed, causes a tensile stress in a radial direction in opposition to the compressive stress which was developed while pressing the wheel on the axle, and that the heavy flange thrust causes a bending action in the plate, which intensifies the tensile stress developed by the heat in the front plate and the compressive stress in the back plate developed while pressing on the axle.

The ratio between these stresses developed in the 70-ton car as compared to the 10-ton car is much greater than that indicated by the mere increase in carrying capacity. The heaviest stress developed is probably that caused by the sudden rise in the temperature of the tread of the wheel from brake shoe application on descending grades.

RECOMMENDATIONS

Our association believes that due to the general conditions confronting us today and considering the safety factor of operation that three designs of wheels, viz: 675 lb., 750 lb. and 850 lb. (with 3-16-in. increase in flange) for 30-ton, 50-ton and 70-ton cars, respectively, would, in a great measure, solve our present troubles and our recommendations would be:

675 lb. wheel for cars having a maximum gross load of 112,000 lb.
750 lb. wheel for cars having a maximum gross load of 161,000 lb.
850 lb. wheel for cars having a maximum gross load of 210,000 lb.

COST

The 8,000,000 tons of chilled iron wheels running today possess a higher relative market value when worn out, based upon their first cost, than is usual with other commodities purchased by the railroads. Hundreds of thousands of chilled iron wheels have been sold at a differential of \$10 per ton, which represents the difference between the original selling price and the scrap value of the old worn-out wheels, and this \$10 per ton differential represents the cost of reconvert ing the old wheel into a new one plus the necessary labor, plus the price of the new material and the profit of the manufacturer. About 30 per cent of all wheels sold are removed by foreign lines and the price paid for these removals is fixed by the printed interchange rules of the Master Car Builders' Association, as follows:

	Chilled Iron	Steel
New value, each.....	\$9.00	\$19.50
Scrap value, each.....	4.75	4.50
Net cost	\$4.25	\$15.00
Cost of removing from and replacing in trucks, per pair 2.25, each.....	1.12	1.12
Cost under car, each.....	\$5.37	\$16.12
Cost of two turnings.....		3.25
Total cost of wheel service, each.....	\$5.37	\$19.37

It will be observed that the total cost for wheel service for other types of wheels is about four times that of the chilled iron wheel and upon this basis of comparison any substitute must yield four times the mileage or time service in order to equalize the cost.

Chilled iron wheels sold at a differential of \$10 per ton makes the net cost of the three Master Car Builders' standards as follows:

625 pounds MCB Wheel for 30 ton cars—\$3.12
675 pounds MCB Wheel for 40 ton cars—3.37
725 pounds MCB Wheel for 50 ton cars—3.62

All chilled iron wheels, unlike other types, are guaranteed for a minimum service. The cost per year with the guarantee is as follows:

Maximum net cost of 625 lb. MCB wheel guaranteed for 6 years—52 cents per year.
Maximum net cost of 675 lb. MCB wheel guaranteed for 5 years—67 cents per year.
Maximum net cost of 725 lb. MCB wheel guaranteed for 4 years—90 cents per year.

Any wheel that is sold for \$20 will cost the railroad, in interest charges alone, (figured at 5 per cent per annum) more than the renewal charges of the chilled iron wheel, because while the guaranteed net cost to the railroads is based upon six, five and four years' service respectively, the actual service is often twice as much. During the last two years the price of all commodities have reached their highest figures. Nevertheless, the price of the chilled iron car wheel has practically remained constant.

SUMMARY

First.—If the chilled iron wheel has been inadequate its deficiency must have been discovered in 67 years of universal use.

Second.—We have not yet reached the capacity of the chilled iron car wheel and today we have in service wheels weighing 950 lb., which are 225 lb. heavier than the heaviest M. C. B. standard. These wheels are carrying a burden of 26,500 lb. per wheel and they have given such satisfactory service under engine tenders of 12,000 gal. capacity that no other type of wheel is considered by the user.

Third.—Our association was organized in the year 1908 for the purpose of improving the quality of the chilled iron wheel, and in the year 1909 we succeeded in having three standard patterns adopted by the Master Car Builders' Association. Previous to that time there were as many patterns in use as there were manufacturers and some railways used special patterns and manufactured the wheels themselves.

Fourth.—Through a close study of the actual service conditions of the chilled iron wheel and through laboratory tests we have found some conditions of service that are not adequately provided for.

Fifth.—Twenty-five lb. per wheel would not appreciably increase our tonnage, but this addition of metal would materially increase the factor of safety.

INTERLOCKING IN THE DALLAS TERMINAL

The two large electro-pneumatic interlocking plants in the union terminal at Dallas, Tex., referred to briefly in the description of this work published in the *Railway Age Gazette* of November 17, 1916, have now been in service long enough to afford some interesting details of their operation. These plants were the two largest installations of the electro-pneumatic type completed during 1916, the one at North Junction having a 103-lever frame with 86 operating levers, and the one at South Junction, a 71-lever frame with 56 operating levers. The plants were put in service on October 1.

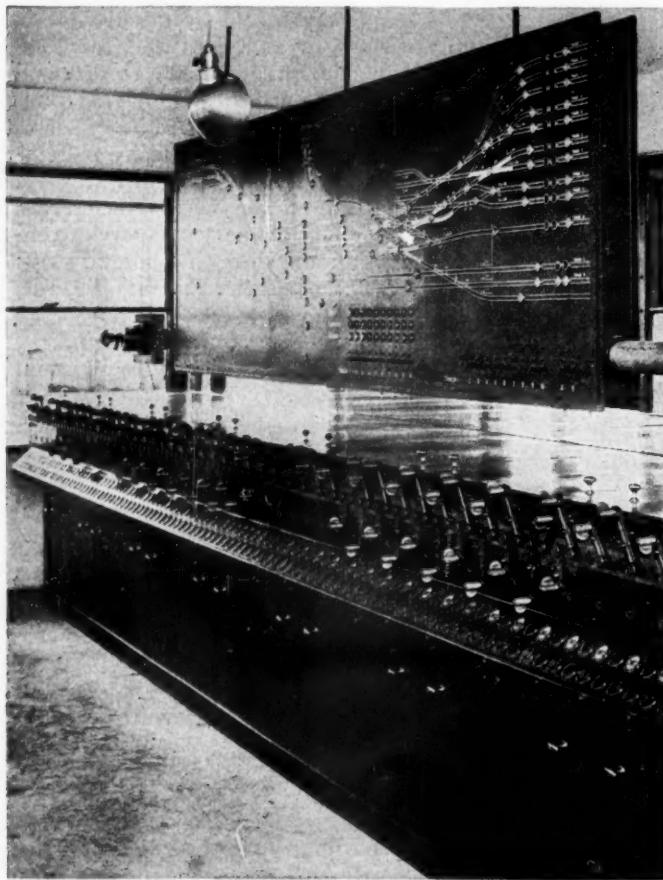
All signal aspects are in the upper right hand quadrant with a single blade on each mast. The first inbound home signal and the last outbound home signal in each route are three-position, the 90-deg. position being provided only for high speed routes. All other signals, except the three-position automatic distant signals, operate in two positions only, giving stop and caution indications. All high (three-position) home signals are semi-automatic, with stick circuits; the arrangement being such that after a train has passed out of the first track section in the route the signal for that section may again be operated, but only to the 45-deg. position until the train has entirely cleared the route.

The first inbound home signal in each route is equipped with approach locking. The levers for those signals which are not provided with approach locking are equipped with mercury time releases so that a certain time interval must elapse after a signal has gone to the stop position before its lever can be placed in the full normal position, so releasing the governed switches. Electric locking of the switch levers

is accomplished by means of indication locks, no special electric locks being used. The interlocking machines are equipped with lever lights on all switch levers, which are lighted only when the switch lever is electrically unlocked. A complete scheme of sectional route locking is used, requiring a total of 208 relays in the north tower, and 115 in the south tower.

The terminal company's power house built in connection with the station, supplies the electric current and compressed air for operating the interlocking plants; and there is an emergency connection to the city power supply. Three-phase, 60-cycle current, at 2,400 volts is delivered to a bank of three $7\frac{1}{2}$ -kv.a., single-phase transformers in each tower which deliver 220-volt current for the a. c. supply to the plant as well as 110-volt current for power and for yard lighting. Motor-generator sets receiving the 220-volt a. c. current deliver direct current at voltages varying from 15 to 30 volts to sets of 10 cells each of 450-a.h., Edison alkaline storage battery. These sets are alternately charged and discharged, the one at the north tower receiving a full charge every six days, and the one at the south tower every eight days.

About 325 miles of copper conductor was used in the installation. The wires are carried in large cables from the

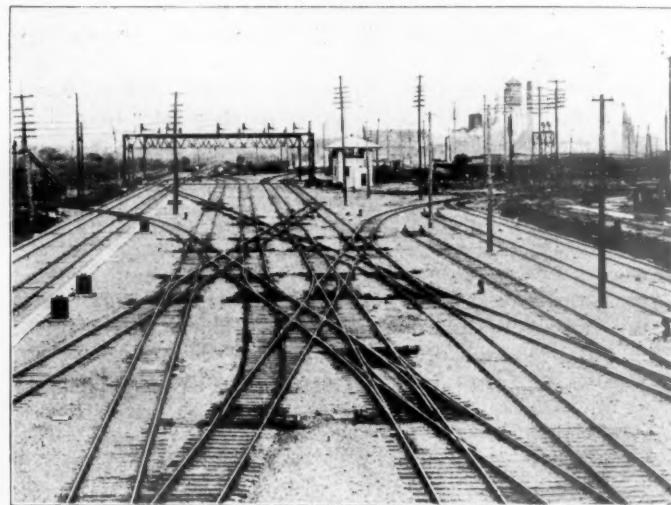


North Tower; Machine, Track Diagram and Control Buttons

towers to instrument cases or relay boxes located at various central points, and from these are distributed in five-conductor and seven-conductor cables to the various switches and signals. The main runs are carried in surface boxes of cypress, except in crossing under tracks, where vitrified clay conduit is used. Wires to branch lines are placed in pitch and laid in built-up trunking made in accordance with the Railway Signal Association standard. All wires and cables were furnished by the Kerite Insulated Wire & Cable Company. The signal air line is two-inch galvanized pipe, and it is installed, wherever possible, in the same box as the wires and cables.

Auxiliary reservoirs are installed at frequent intervals in the main line, but none are provided at individual switches and signals. Only one line of pipe is used, but any 200-ft. section can be cut out for repairs and the remainder connected through by a hose connection.

One of the most interesting features of the installation is the complete indicating and intercommunicating system which expedites train movements and reduces the necessary operating force to a minimum. With these facilities each tower is operated by one man, except during one or two hours each day when a second man is required to help on the machine and records. An illuminated track diagram is hung from the ceiling directly over each interlocking machine,



North Junction, Looking North

these diagrams being of steel with colored track sections on a black background. Each track section is equipped with a white indicating light which is lighted only when the track section is unoccupied. Traffic levers are provided for the two freight tracks between the north and south junctions, enabling the tower men to move trains either way on either track. There is none of this check-locking between the towers for the station tracks, but a complete system of push buttons and lights is installed on the illuminated track diagrams to give each tower complete information as to moves being made from the other tower into the station tracks. If the north tower wants to use track 6, for instance, the leverman pushes button No. 6 which lights a green light on track 6 on the north tower diagram and a red light on the same track on the south tower diagram. This arrangement, also the train starting system, is proving very efficient and useful.

The train starting system is also operated by means of push buttons and lights installed on the illuminated diagram and at the station platforms and gates. The system is similar to that used in the Washington terminal, arrangements being made for conductors to notify the tower when a train is ready to start. The tower then notifies the gateman, and he in turn notifies both the conductor and the tower when all passengers have entered and the gate is closed. The towerman restores the system to normal by again pushing the button after the train has left. A separate circuit is provided for each platform. In addition to these communicating systems there is a telautograph circuit connecting the telegraph office with the interlocking towers, baggage rooms, etc., for announcing trains, and a very complete system of automatic telephone with instruments located at outlying signals and other important points throughout the plant.

We are indebted for the above details to G. K. Thomas, assistant signal engineer, Atchison, Topeka & Santa Fe. All signal apparatus was furnished by the Union Switch and Signal Co.

General News Department

G. W. W. Hanger, federal mediator, announced at New York, February 8, that the New York, New Haven & Hartford had settled with its complaining telegraphers. Numerous increases in pay were granted. The settlement holds good for one year.

J. E. Long, safety engineer of the Canadian Government Railways, is to make use of motion pictures in lecturing to the employees of the government roads. A car has been fitted up and the pictures will be shown at all important points on the lines.

With the temperature at 20 deg. F. below zero and a strong wind raging, fire broke out in the passenger station of the Northern Pacific at Brainerd, Minn., on the night of February 5, and completed destroyed the structure, which was valued at \$27,000. The second floor was occupied by the offices of the Minnesota & International.

The United States Senate on Tuesday voted against increasing the postal rates on magazines and newspapers. An amendment to the post office appropriation bill, making the increase, was stricken out of the bill in the debate in the Senate on February 10, on a point of order; and this week an effort was made to secure its restoration, under suspension of the rules of the Senate, but the effort failed. This, apparently, settles the matter for the present session.

The Enid, Ochiltree & Western planned recently to take up that portion of its track which runs between Dalhart, Tex., and Wilcox, a distance of 13 miles; but the State secured an injunction, and under a decision just rendered by the State Supreme Court, the removal of the track is forbidden. The railway contemplated using the rails in the construction of another line from Higgins, Lipscomb county, to Ochiltree. Associate Justice Yantis, in the opinion, said that to remove the track to other counties for the purpose of use in the construction of another road, would be illegal under the statute.

To save the lives of deer on the railroad tracks at night the Southern Pacific has issued orders to its enginemen that when a deer is seen the headlight shall be extinguished for a moment. The order was issued at the request of the California State Fish and Game Commission, who explained that deer frequently use the tracks in their migrations at this time of the year from higher to lower altitudes, and that the glare of the headlight dazes them to the extent that they are run down before they can escape. More than a dozen were killed by trains in California last month. It has been discovered that if the headlight is extinguished, if only for a second, the animals are able to jump to safety.

The Canadian Government is making practical use of its recent inventory of the "man power" of the country, through the National Service Board, by calling on hundreds of men capable of taking employment on the railways to relieve the present congestion of freight. The difficulty of moving coal, with other transportation tangles, has been found to be due largely to scarcity of locomotive enginemen and roundhouse mechanics. Through the National Service inventory, every Canadian has been required to give details of his calling and to answer the question: "Are you willing to take work elsewhere in Canada at same pay if railway fare is paid?" To this, the reply was usually in the affirmative. The National Service Board found that thousands of workmen were not employed in lines in which they were most proficient and useful, and this was true of many hundreds of railroad men. Some of these men are now being summoned to live up to their written assurance.

The Webb bill to permit exporters engaged in foreign trade to establish joint foreign selling agencies, which has been passed by the House and is one of the measures on the administration legislative program, was reported favorably by the Senate Committee on Interstate Commerce on February 9, with some amendments designed to make certain that such agencies shall not be given any opportunity to violate the anti-trust law as applied to domestic business or to "artificially and unduly enhance prices

within the United States." The advocates of the bill are having some difficulty in the effort to bring it to a vote. The Chamber of Commerce of the United States has issued a statement saying that the bill has reached a critical stage because of the short time left before the expiration of the present session of Congress. In the Senate Democratic caucus Senator Lewis, of Illinois, attempted to secure an agreement for the attachment of the bill to the revenue bill as a rider and failed. The United States Chamber of Commerce has issued a countrywide appeal to its affiliated members to bring pressure to bear to secure a vote on the bill.

National Safety Bulletins

The National Safety Council, whose very interesting convention at Detroit was reported in the *Railway Age Gazette*, October 27, 1916, page 735, has issued the first three of its proposed series of pamphlets on Safe Practices. Number one is devoted to ladders. It fills 12 large pages and goes into minute detail, with drawings, concerning every phase of the construction and use of ladders. Ladder accidents resulted, in the United States, in 1914, in 694 fatalities. The coroner of Cook county, Illinois, says that there were 30 fatal ladder accidents in that county in 12 months. The second bulletin, consisting of eight pages, deals with stairs and stairways, and the third, of eight pages, contains elaborate rules for the safe management of boiler rooms. These bulletins, and other matter published by the National Safety Council, may be had from W. H. Cameron, general manager, 208 South La Salle street, Chicago.

Pennsylvania Pensions

The Pennsylvania Railroad announces a change in the method of determining the amount of employees' pensions, which will result in increased allowances in a number of instances. A minimum of \$15 a month will also be established. It has been found that in some cases employees, on account of sickness or old age, were unable to make full time during the last ten years of service, and this resulted in the amount of the pension being less than they otherwise would have received. Now, in order to arrive at the average monthly pay of an employee who has been unable to make full time, the total amount of money earned during the last ten years will be divided by the total number of months or parts thereof he was actually engaged. In case an employee should not be engaged at all during the ten-year period, the pay he received for the last full month, working under normal conditions, will be considered his average pay, under the new regulation. The pension list of the lines east of Pittsburgh now contains 3,673 names.

Good Bye to the Circus?

The United States Circus Corporation is to give up traveling by railroad, and is to have 100 Kelly-Springfield motor trucks of 3½ tons capacity, and 75 trailers. An agent of the corporation spent eight weeks on the Mexican border investigating the work of the various motor truck fleets used there by the United States army.

The bodies for the trucks and trailers, of carved wood and decorated in the brilliant show style, are being made in Cincinnati. The bodies of the trailers will be in three lengths, 14, 22 and 24 feet. The first exhibition will be given in New Jersey, and the route for the summer season will be through New York and the New England states, thence westward. The work of motor trucks in supplying the punitive expedition in Mexico has proved a satisfactory test. Arrangement must be provided for quick repairing and maintenance, for towing disabled trucks to the next stand, for hauling by tractors, on and off the soft ground of the circus lot, for strengthening bridges, etc. There may be more serious problems; for example, the sleep that performers may get in their trailer "Pullmans" bumping over rough roads through the night.—*New York Mail*.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1916

Name of road.	Average mileage operated during period.			Operating revenue			Maintenance of equipment.			Operating expenses			Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.		
	Freight.	Passenger.	Total (inc. misc.)	Way and structures.	Traffic.	Trans- lation.	Miscellaneous.	General.	Total.									
Alabama & Vicksburg.....	\$116,919	\$50,919	\$164,269	\$29,528	\$3,602	\$66,522	\$2,721	\$5,374	\$126,353	\$57,916	\$12,179	\$45,738	\$7,835					
Alabama Great Southern.....	312	374,733	138,542	46,973	103,809	14,321	139,419	4,179	12,240	328,970	234,859	18,316	216,536	53,593				
Ann Arbor.....	302	157,661	48,921	56,829	31,332	65,971	5,278	88,182	115,151	207,296	120,901	421	88,143	42,117				
Arizona Eastern.....	378	279,180	49,747	353,753	230,675	57,272	41,183	3,143	85,647	16,958	207,822	145,931	120,111	125,804	47,086			
Atchison, Topeka & Santa Fe.....	8,648	7,490,814	2,482,108	10,899,809	1,272,806	2,269,702	270,381	3,50,480	3,040	309,967	7,591,465	3,308,343	547,874	2,759,270	-772,225			
Atlanta & West Point.....	93	69,134	53,318	146,112	9,097	32,145	6,390	66,161	1,979	51,98	100,781	40,313	8,184	32,131	-4,364			
Atlanta, Birmingham & Atlantic.....	640	269,328	70,788	346,616	41,700	49,882	17,120	122,099	1,27	10,641	241,444	10,599	110,543	22,294				
Atlantic Coast Line.....	4,761	2,654,122	939,351	3,839,524	382,234	55,843	59,306	1,123,787	11,886	80,978	218,364	9,457	161,494	22,614				
Atlanta & Ohio Chicago Terminal.....	79	43,501	43,501	80,430	151,751	14,186	24,005	82,674	1,806	11,663	134,158	17,583	22,659	-5,106				
Baltimore & Chesapeake & Atlantic.....	88	33,015	33,015	2,224	33,275	1,404	47,161	3,304	87,406	6,975	2,600	44,913	2,631	-9,607	-25,983			
Banor & Arroostook.....	632	254,775	61,482	338,364	36,010	37,878	2,082	7,729	3,187	13,957	180,005	13,559	144,125	37,176				
Belt Ry. Co. of Chicago & Lake Erie.....	205	607,839	30,569	659,859	62,416	215,568	18,370	151,425	8,014	213,75	86,588	13,256	35,246				
Bessemer & Lake Erie.....	36	204,056	204,056	213,004	47,329	27,502	224,160	19,358	77,148	59,846	63,013	30,819	32,158	-13,919				
Bingham & Maine.....	2,298	2,785,510	1,419,704	4,738,024	526,040	632,427	41,183	1,328	75	6,998	93,048	7,134	85,914	-22,684				
Buffalo & Susquehanna R. R. Corp.....	253	128,601	2,510	138,492	16,428	29,792	1,501	38,452	4,806	90,980	47,513	2,600	44,913	-20,560				
Buffalo, Rochester & Pittsburg.....	586	871,170	114,641	981,418	109,577	276,640	14,326	1,602	28,559	827,710	20,171	22,000	179,177	-68,492				
Canadian Pacific Lines in Maine.....	234	241,960	21,374	274,928	22,838	32,292	5,871	121,713	5,530	189,244	85,684	3,333	89,006	26,893				
Carolina, Clinchfield & Ohio of S. C.	18	278,019	23,154	307,799	18,077	38,260	24,149	57,122	10,337	146,491	161,317	17,000	144,307	40,582				
Central New England.....	301	377,201	30,546	429,125	81,996	37,306	1,151	152,353	747	6,867	280,030	149,075	22,000	127,075	-33,120			
Central Vermont.....	411	241,034	75,291	365,776	46,917	40,916	8,874	17,278	2,525	9,371	463,882	79,323	15,542	16,933	-3,434			
Charleston & Western Carolina.....	342	142,713	45,222	196,382	32,376	13,491	5,150	67,319	2,611	47,722	123,059	7,616	80,933	12,425				
Chesapeake & Ohio Lines.....	2,381	312,525	57,827	415,519	52,620	55,793	14,524	278,212	2,669	93,133	281,322	13,347	140,317	28,599				
Chicago & Alton.....	1,053	1,055,209	378,388	1,552,570	184,475	313,059	40,307	55,742	10,339	37,887	1,163,011	58,120	329,185	329,185	20,832			
Chicago & Eastern Illinois.....	1,136	1,124,271	285,992	1,528,879	162,719	429,287	22,810	50,785	8,353	35,957	1,231,896	296,984	63,750	232,395	-153,438			
Chicago & Erie.....	8,108	535,661	1,983,394	8,334,466	710,310	1,346,402	105,562	3,150,943	58,004	18,749	48,727	140,275	8,945	131,330	-165,521			
Chicago & North Western.....	1,996	1,012,918	318,683	1,456,992	207,243	222,168	45,836	50,944	11,220	72,023	1,05,277	2,786,311	43,026	2,351,025	257,959			
Chicago, Indianapolis & Louisville.....	622	2,743,464	173,037	2,905,315	114,244	23,088	8,383	23,288	15,544	45,539	1,123,216	680,304	91,354	549,426	-24,216			
Chicago Junction.....	13	6,421,584	1,718,801	9,165,801	710,021	1,446,976	140,444	3,698,002	64,186	174,156	6,084,865	3,080,935	470,337	4,240	-50,191			
Chicago, Milwaukee, St. Paul & Pacific.....	10,208	255	122,136	1,155,793	20,331	58,522	14,478	1,624,424	55,555	127,803	217,900	6,000	2,608,037	575,946				
Chicago, Peoria & St. Louis.....	477	255,252	63,195	340,488	40,579	32,397	6,660	10,001	1,126	8,795	194,032	146,087	6,456	14,376	1,437,447	352,641		
Chicago, Rock Island & Pacific.....	7,655	4,626,068	1,770,660	6,961,442	492,493	1,199,408	249,568	2,78,854	6,327	155,496	4,90,734	2,70,708	4,70,403	5,98,247	35,016			
Chicago, St. Paul, Minn. & Omaha.....	1,753	1,179,328	482,378	1,803,520	134,576	211,317	32,088	68,255	15,544	45,393	166,481	91,354	58,822	94,58				
Chicago, Terre Haute & Southeastern.....	373	271,444	18,788	297,021	24,391	1,446,976	140,444	3,698,002	64,186	8,121	204,455	4,924	4,240	-50,191				
Cincinnati, Hamilton & Dayton.....	622	605,544	98,444	785,411	126,502	142,478	13,486	18,668	1,746	17,785	107,853	11,893	95,898	16,191				
Cincinnati, Rock Island & Gulf.....	322	136,288	203,798	320,798	16,647	26,459	8,629	80,135	476	12,001	126,001	11,796	72,114	75,936	-75,936			
Cincinnati, Northern, Cincinnati, Chic. & St. Louis.....	1,103	251,251	1,123,135	100,354	224,799	207,243	20,359	236,321	9,622	24,629	711,848	411,287	52,000	359,247	65,181			
Cleveland, Cincinnati, Chic. & St. Louis.....	2,387	93,418	17,802	156,431	4,138	30,790	3,956	64,204	25,944	3,140	52,415	2,70,668	1,237,491	13,105,376	-193,116			
Colorado & Midland.....	338	107,103	11,625	126,373	15,512	40,297	6,790	6,790	6,427	2,999	2,73,259	2,43,044	5,000	13,448	-895			
Colorado & Southern.....	1,103	206,905	120,780	383,404	69,767	139,983	9,567	26,051	3,637	24,435	513,439	369,965	39,000	330,926	29,959			
Cripple Creek & Colorado Springs.....	87	307,300	30,633	348,915	30,633	687,648	86,086	1,540,253	2,52,416	3,140	2,74,415	2,70,668	1,237,491	13,105,376	-193,116			
Cumberland Valley & Hudson Co.—R. R. Dep't.....	164	231,530	60,879	291,309	21,327,333	127,553	421,499	4,267	114,266	1,748	18,296	284,496	22,804	29,045	52,700	-111,701		
Dalaware & Lackawanna & Western Co.	955	3,045,660	775,019	4,296,219	180,168	320,958	689,522	85,344	1,78,465	1,87,600	10,000	1,241,843	592,080	1,241,843	1,241,843	-350,177		
Denver & Rio Grande.....	2,578	1,751,024	322,700	2,079,958	190,869	41,165	64,025	24,187	24,187	10,000	3,054,325	1,341,443	866,914	98,000	1,07,146	-435,322		
Denver & Salt Lake.....	255	1,374,456	31,917	96,780	11,072	37,528	2,296	7,947	4,379	143,935	15,826	1,241,843	1,241,843	1,241,843	1,241,843	-350,177		
Detroit & Mackinac.....	383	57,611	148,708	150,297	15,753	19,380	1,769	3,729	1,769	1,769	22,330	24,455	-4,859	29,317	17,959			
Detroit & Toledo Shore Line.....	81	148,708	15,811	183,183	15,191	15,210	1,778	10,426	1,778	1,778	20,402	79,595	6,640	72,825	-30,143			
Duluth, & Iron Range.....	269	164,806	27,690	207,041	8,125	67,231	4,290	11,258	1,574	53,829	24,488	-39,456	9,470	49,351	45,225			
Duluth, Missabe & Northern.....	414	291,537	36,120	366,535	104,992	121,285	9,229	14,310	1,308	58,755	43,874	-27,205	33,809	-106,014	60,058			

REVENUES AND EXPENSES OF RAILWAYS

— MONTH OF DECEMBER, 1916—CONTINUED

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1916—CONTINUED.

Name of road.	Average mileage operated during period.			Operating revenues—Total Freight. Passenger. (inc. misc.)			Maintenance of equipment. Way and structures.			Operating expenses—Total Transportation. Traffic. Miscellaneous.			Net from railway operation.			Operating income (or loss). Tax accruals.			Increase (or decrease) comp. with last year.		
	1,944	\$1,317,164	\$333,765	\$2,192,607	\$199,138	\$337,191	\$36,577	\$806,536	\$11,960	\$45,071	\$1,432,784	\$759,823	\$111,287	\$645,981	\$105,449	18,675	18,675	18,675			
Texas & Pacific.	1,243	39,004	103,884	12,171	3,707	7,963	17,198	3,848	180,148	9,926	50,226	189,591	15,000	42,820	27,820	18,675	18,675	18,675			
Toledo, Peoria & Western.	451	429,324	40,229	492,773	20,946	65,162	6,716	11,427	32,889	1,025	4,259	188,182	18,900	158,500	11,262	11,262	11,262	11,262			
Ulster & Delaware.	129	34,012	14,887	5,210	6,162	442,723	1,007,069	135,895	2,125,293	117,414	1,977,351	245,244	1,731,551	1,731,551	14,721	14,721	14,721	14,721			
Union Pacific.	3,622	4,445,212	980,082	5,991,770	442,723	1,007,069	135,895	2,125,293	117,414	4,014,418	1,977,351	245,244	1,731,551	1,731,551	555,449	555,449	555,449	555,449			
Union R. R. of Baltimore.	8	127,402	28,618	12,390	15,277	26,180	26,180	1,685	23,586	43,961	11,882	17,214	403,690	8,130	129,304	9,582	9,582	9,582			
Union R. R. of Pennsylvania.	32	109,158	828,559	225,950	1,210,049	74,902	226,921	26,339	3,743	48,692	27,692	804,200	405,849	54,834	350,828	39,414	39,414	39,414			
Vandalia.	171	65,336	198,136	198,136	19,486	2,009,621	2,009,621	930	1,661	2,009,621	1,661	1,661	1,661	1,661	1,661	1,661	1,661	1,661			
Wabash, Shreveport & Pacific.	510	597,215	49,472	650,377	62,136	954,411	5,431	269,946	13,772	16,554	400,946	289,431	38,080	283,416	82,902	82,902	82,902	82,902			
Wabash.	2,519	2,395,774	645,306	3,133,770	288,678	460,718	100,472	1,255,185	19,905	77,092	2,185,935	1,127,835	108,844	1,018,484	135,525	135,525	135,525	135,525			
Wabash-Pittsburgh Terminal.	63	69,235	10,267	87,687	17,962	13,890	1,658	33,632	1,513	4,331	72,987	14,700	11,171	3,527	16,559	16,559	16,559	16,559			
Washington Southern.	36	62,214	66,623	120,314	13,761	23,310	1,324	57,858	1,025	3,748	101,325	68,989	63,010	63,010	16,016	16,016	16,016	16,016			
West Jersey & Seashore.	359	181,049	266,528	455,915	128,638	94,333	14,127	25,664	3,440	16,551	51,390	18,075	13,799	5,098	4,444	4,444	4,444	4,444			
Western Maryland.	773	88,733	1,023,563	111,988	161,612	20,400	328,439	11,701	23,793	664,111	359,451	43,500	315,828	5,945	5,945	5,945	5,945	5,945			
Western Pacific.	958	580,289	93,347	715,969	79,116	72,794	23,588	25,693	10,023	24,173	42,538	20,582	30,137	26,470	154,996	154,996	154,996	154,996			
Western Ry. of Alabama.	113	550,852	47,318	131,031	97,847	24,240	6,396	35,999	2,199	4,774	82,465	48,567	39,181	11,193	11,193	11,193	11,193	11,193			
Wheeling & Lake Erie.	512	550,293	64,780	672,869	97,123	159,640	9,526	264,029	1,701	132,95	1,701	54,359	61,300	82,385	40,418	40,418	40,418	40,418			
Wichita Valley.	257	84,592	27,508	115,659	17,982	8,132	2,926	21,296	9,93	1,142	70,470	27,666	58,614	2,169	2,169	2,169	2,169	2,169			
Yazoo & Mississippi Valley.	1,145,898	483,106	1,697,264	182,156	169,533	182,156	468,292	2,710	36,897	877,104	820,160	77,542	742,562	159,221	159,221	159,221	159,221	159,221			

Six Months of Fiscal Year, 1917

Name of road.	Freight.	Passenger.	(inc. misc.)	Total	Maintenance of equipment.	Way and structures.	Traffic.	Transporation.	Miscellaneous.	General.	Total.	Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) comp. with last year.			
Alabama & Vicksburg.	143	\$628,625	\$249,481	\$969,674	\$107,710	\$176,850	\$21,391	\$342,059	\$15,054	\$47,023	\$697,643	\$227,031	\$59,978	\$212,052	\$61,657	\$61,657	\$61,657	
Alabama Great Southern.	312	2,095,420	719,275	3,070,600	3,291,559	3,291,559	86,130	844,060	18,98	69,222	1,861,568	1,193,553	1,193,553	1,072,976	279,876	279,876	279,876	
Ann Arbor.	302	1,099,352	309,813	1,461,128	164,560	211,201	31,321	556,823	3,493	53,108	1,060,533	400,564	400,564	320,328	55,857	55,857	55,857	
Arizona Eastern.	378	1,628,982	279,985	1,908,967	202,763	335,232	26,025	14,986	410,713	16,422	81,602	1,063,533	989,230	989,230	900,149	268,502	268,502	268,502
Atchison, Topeka & Santa Fe.	8,636	45,945,199	13,955,683	64,912,882	7,816,919	10,381,189	1,177,000	1,320,600	1,320,600	1,320,600	1,320,600	1,320,600	1,320,600	1,320,600	3,071,418	3,071,418	3,071,418	
Atlanta & West Point.	93	392,858	278,308	774,011	78,182	133,792	89,089	218,926	12,177	29,607	511,538	262,473	43,976	218,347	56,217	56,217	56,217	
Atlanta, Birmingham & Atlantic.	640	1,328,726	347,266	1,681,976	1,681,976	2,311,257	3,111,461	350,475	620,836	60,137	1,331,163	1,331,163	83,889	446,097	1,567,428	1,567,428	1,567,428	
Atlantic Coast Line.	4,761	12,442,201	4,379,326	18,284,960	18,284,960	22,020,729	10,174	133,861	5,439	5,439	461,753	122,191,160	6,065,820	5,153,913	1,162,211	1,162,211	1,162,211	
Baltimore, Chesapeake & Atlantic.	79	47,700	25,364	71,759	71,759	116,309	9,637	9,639	9,639	10,771	45,422	173,817	136,131	36,282	128,527	128,527	128,527	
Banion & Aroostook.	632	1,430,800	384,665	1,911,720	259,500	308,734	50,074	507,074	21,770	21,770	507,074	21,770	21,770	81,402	653,940	176,741	176,741	
Belt Ry. Co. of Chicago.	311	205	6,208,384	218,824	1,687,234	116,305	206,047	9,338	76,610	1,551,560	1,551,560	1,551,560	1,551,560	1,551,560	53,655	87,205	87,205	87,205
Bessemer & Lake Erie.	36	1,322,897	1,542,384	18,543	1,576,721	1,189,602	220,564	10,546	6,451	208,013	400	149,177	3,400,659	222,846	570,732	570,732	570,732	
Bingham & Garland.	79	47,700	25,364	71,759	71,759	116,309	23,321	22,230	11,659,622	141,764	619,532	15,242	15,242	2,916,530	316,830	316,830	316,830	
Boston & Maine.	88	2,217,180	16,775,499	9,217,180	28,942,421	3,689,233	22,230	22,230	11,659,622	141,764	619,532	14,755	14,755	1,037,031	1,148,303	1,148,303	1,148,303	
Buffalo & Susquehanna R. R. Corporation.	253	801,935	38,590	897,549	1,627,349	1,627,349	8,601	5,398	976,153	1,727,732	57,065	1,727,732	57,065	450,366	123,263	123,263	123,263	
Buffalo, Rochester & Pittsburgh.	586	5,820,360	668,733	668,733	668,733	1,211,625	1,211,625	344,900	27,333	187,183	532,991	16,138,381	1,728,940	1,728,940	1,728,940	1,728,940	1,728,940	
Canadian Pacific Lines in Maine.	234	1,344,149	340,953	4,286,089	3,923,555	4,286,089	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	1,242,291	
Carolina, Clinchfield & Ohio.	283	1,322,897	1,512,241	1,189,602	1,512,241	1,189,602	1,189,602	1,189,602	1,189,602	1,189,602	1,189,602	1,189,602	1,189,602	1,189,602	224,220	224,220	224,220	
Carolina, Clinchfield & Ohio Lines.	18	1,496	5,984,963	8,648,995	1,933,175	8,648,995	1,304,367	7,897,751	7,897,751	7,897,751	7,897,751	357,763	1,027,081	33,921,269	2,585,000	3,229,024	3,229,024	
Central New England.	301	2,447,517	3,813,013	8,514,807	254,807	254,807	7,459	8,151,114	13,708	13,708	13,708	13,708	13,708	1,947,374	379,800	99,000	1,221,967	

Hearing on Valuation Protest

The Interstate Commerce Commission has announced a hearing for the taking of testimony on the protest of the Texas Midland against the tentative valuation recently issued by the commission, to be held at the office of the commission in the Interstate Building, Kansas City, on March 5, before Examiner J. E. Benton. At this hearing testimony will be taken concerning the unit prices fixed by the engineering report which are drawn in question by the protest and on no other subject. At the conclusion of this hearing an adjournment will be taken to some convenient point on the Texas Midland, where testimony will be taken only on the value of lands and their classification as carrier or non-carrier lands; no testimony will be taken as to the cost of condemnation and damages or of purchase. Testimony, if any, on this point should be produced, the commission says, at the hearing at Washington on March 19 and all parties, including the division of valuation, are expected to introduce their entire testimony at these sessions on the matters covered.

The Interstate Commerce Commission on Wednesday of this week issued its tentative valuation report on the property of the Elgin, Joliet & Eastern. The Winston-Salem Southbound Railway has filed a protest against the commission's tentative valuation of its property.

Council of National Defense

The Council of National Defense created by an act of Congress last summer for the purpose of studying the transportation question and the organization of the industry and commerce of the country in their relation to military purposes, held a joint meeting at Washington on Monday with the advisory commission appointed by the President to work in co-operation with the council for the consideration of various plans for a mobilization of the nation's resources as a part of the national defense program. A large number of manufacturing companies from all parts of the country, including many companies engaged to a large extent in the railway supply business, have sent offers to the various government departments to place their facilities at the disposal of the government in case of an emergency, and, according to a statement issued on behalf of the council, it was thought that these numerous offers afford an especially favorable opportunity for beginning the work for which the council was created. All of these offers have been turned over to the advisory commission, which has announced that it will hold daily sessions throughout the week in making its study of the entire situation. The council was created, according to the terms of the act, "for the co-ordination of industries and resources for the national security and welfare," and consists of the Secretaries of War, Navy, Interior, Agriculture, Commerce and Labor. The advisory commission appointed by the President consists of seven members, each having special knowledge of some industry, public utility or natural resource. President Daniel Willard, of the Baltimore & Ohio, represents the railroad industry on the commission, which is expected to devote special attention to the relation of transportation to national defense. At a meeting on Tuesday the members of the commission were authorized to appoint committees to take charge of various divisions of the work. Mr. Willard was appointed chairman of a committee on transportation.

"Tennessee Curve"

The Southern Railway, addressing the Confederate veterans who are going to Washington to attend their annual reunion, May 28, calls attention to one stretch of its road, 48 miles in length, which was built by Confederate soldiers and has remained as perhaps the most permanent monument of any work done by the Confederacy. This is the line between Greensboro, N. C., and Danville, Va. When the war began there was no railroad connecting the Richmond & Danville with the North Carolina system of railroads. The Confederate authorities saw the strategic value of such a line, and were able to bring to bear sufficient pressure to overcome the obstacles, which had previously stood in the way of its construction owing to the rivalry of North Carolina and Virginia, each state seeking to protect its own railway interests. The necessary rail was procured by tearing up other tracks. When, at the close of the war, the line was confiscated by the United States as one of the assets

of the Confederacy, there was prolonged litigation before the Richmond & Danville secured undisputed title. The origin of this line is remembered in many local traditions and names, among them "Tennessee Curve," said to have been so called because the grading at this point was done by men of a Tennessee regiment.

Lehigh Valley May Electrify

The Lehigh Valley announces that it is making a thorough study of the possibilities and advantages of electrifying portions of its lines through the anthracite region, including the Wyoming division on the main line between Mauch Chunk and Pittston Junction, Pa., and the Mahanoy and Hazleton division, which is a branch line between Penn Haven Junction on the main line and Mount Carmel. The proposed electrification involves 83 miles of double-track main line and 62 miles of double-track branch line, or a total of 145 double-track miles. Based on the cost of similar projects it is estimated that the improvement will involve an expenditure of approximately \$10,000,000, including locomotives.

It is understood that no definite decision has been reached as yet. The road is simply studying the situation and particular attention, of course, is being given to those sections of the line which, because of physical and traffic conditions, are most suitable for electrification. It is of interest to note that one of the sections mentioned includes the city of Wilkes-Barre, Pa., which has a population of about 80,000.

The sections of line being considered for electrification are in the heart of the anthracite region of Pennsylvania, which means that both the traffic and the physical conditions of the road are similar to those on the electrified division of the Norfolk & Western. Both the main line and the branch are characterized by heavy grades and curves, and a large part of the traffic consists of heavy tonnage coal trains moving in both directions over the main line, but principally northeast on the branch. The general merchandise freight traffic on this section of the Lehigh Valley is considerably heavier than that of the Norfolk & Western, however, as it passes through a number of fairly large cities.

Electric power necessary for operating the trains will be obtained from both steam and hydro-electric plants, and it is understood that the power will be purchased. The use of electric power will make it possible to burn a cheaper grade of coal in stationary power plants than is required for steam locomotives, and a considerable saving will thus be effected.

The success of the Norfolk & Western and the Chicago, Milwaukee & St. Paul electrifications has undoubtedly been a factor in the decision of the Lehigh Valley to investigate the desirability of electrification on its own line. W. J. Wilgus, consulting engineer, of New York, is making the investigation for the railroad company.

The Washington Traffic Club

Francis H. Sisson, assistant chairman, Railway Executives' Advisory Committee, delivered an address at the annual dinner of the Washington Traffic Club at Washington, D. C., on February 10, on the subject of "Pressing Railroad Problems." Mr. Sisson said, in part:

"There have been three important periods in railroad history. The first, that of construction, from the date of the first railway in 1828 to 1875; the second, that of competition and expansion, from 1875 to 1906; the third, that of regulation, from 1906 to date. In the hope that there may be before us a fourth period in railroad history, which will be one of co-operation between all the various parties interested in and dependent upon transportation, the railroads are attempting to explain their situation to the public, still holding the faith that when the public clearly understands the problem, public co-operation will be assured.

"Too long the attitude of the public toward the railroads has been one of detached criticism and punitive legislation, treating the railroad interests as though they were something apart from itself, from which it might properly wring the last possible ounce of service at the lowest possible cost, with eyes fixed solely upon immediate, local, and selfish interests.

"That policy could have but one effect, which is today glaringly apparent. Impaired railroad credit, reduced efficiency, and transportation facilities inadequate to the needs of commerce, are the

harvest we are reaping from the sowing of these ten years of disordered, often unintelligent, many-sided, and punitive regulation.

"Today, in the face of constantly rising costs of material and labor, with rapidly growing taxes, the railroads turn to the business men of the country and ask them to consider this problem, not in the interest of the railroads, but in their own interest—in the interest of commerce, for the protection and development of the nation and the nation's business."

Other speakers were Senator Thomas W. Hardwick of Georgia, who advocated strongly the centralization of railroad regulation in the hands of the federal government, and Representatives P. P. Campbell of Kansas and John R. Farr of Pennsylvania.

Clearing Snow-Covered Tracks by Steam

During the severe storms of last winter, the Chicago, Burlington & Quincy used locomotives successfully in clearing snow and ice from interlocking plants and yard switches at Galesburg and Quincy, Ill., by means of steam. On one occasion an engine cleaned 80 switches in Quincy yard in about three hours, after a snowfall of one foot. To have done this work by hand would have required the services of 100 men. The locomotives are equipped with globe valves on the steam dome for blowing out the boilers. A pipe is attached to this globe valve and carried along the top of the boiler, near the hand rail, to the front end of the smoke box, then down the front of the engine to a point about one foot above the rail, and then across to the other rail with outlets at each rail. From the dome down to the near rail a 1½-in. pipe is used, beyond which a 1-in. pipe extends to just inside the further rail, the smaller pipe being curved out at an angle ranging from 22½ to 45 deg. In cleaning interlocking plants a locomotive equipped with a 50-ft. length of hose is used.

National Railway Appliances Exhibit

All available space in the Coliseum and Annex, Chicago, has now been assigned for the annual exhibit of the National Railway Appliances Association which will be held from March 19 to 22 inclusive, the week of the annual convention of the American Railway Engineering Association and the stated meeting of the Railway Signal Association. The exhibit will be open from 8 a. m. to 10 p. m. each day. A total of 142 firms have contracted for space and will present exhibits. A list of these firms is given below:

Adams & Westlake Co., Chicago.
 Adams Motor & Manufacturing Co., Chicago.
 A. G. A. Railway Light & Signal Co., Elizabeth, N. J.
 Ajax Rail Anchor Co., Chicago.
 Alger Supply Co., Chicago.
 American Guard Rail Fastener Co., Philadelphia, Pa.
 American Hoist & Derrick Co., St. Paul, Minn.
 American Kron Scale Co., New York.
 American Railway Bridge & Building Association.
 American Steel & Wire Co., Chicago.
 American Valve & Meter Co., Cincinnati, Ohio.
 American Vulcanized Fibre Co., Wilmington, Del.
 Anchor Company, Chicago.
 Armeo Iron Culvert Mfrs., Middletown, Ohio.
 Asphalt Ready Roofing Co., New York.
 Associated Mfrs. of Malleable Iron, Cleveland, Ohio.
 Automatic Electric Co., Chicago.
 Ayer & Lord Tie Co., Inc., Chicago.
 Barrett Manufacturing Co., New York.
 Brach Supply Co., L. S., Newark, N. J.
 Bethlehem Steel Co., Bethlehem, Pa.
 Bryant Zinc Co., Chicago.
 Buda Co., The, Chicago.
 Carnegie Steel Co., Pittsburgh, Pa.
 Chicago Bridge & Iron Works, Chicago.
 Chicago Flag & Decorating Co., The, Chicago.
 Chicago Malleable Casting Co., Chicago.
 Chicago Pneumatic Tool Co., Chicago.
 Chicago Railway Signal & Supply Co., Chicago.
 Cleveland Frog & Crossing Co., Cleveland, Ohio.
 Creepcheck Co., Inc., New York.
 Crerar-Adams & Co., Chicago.
 Cornell Wood Products Co., Chicago.
 Cast Iron Pipe Manufacturers, Chicago.
 Carbic Mfg. Co., Duluth, Minn.
 D. & A. Post Mold Co., Three Rivers, Mich.
 Detroit Graphite Co., Detroit, Mich.
 Paul Dickinson, Inc., Chicago.
 Dilworth-Porter & Co., Ltd., Pittsburgh, Pa.
 Joseph Dixon Crucible Co., Jersey City, N. J.
 Duff Manufacturing Co., Pittsburgh, Pa.

Thomas A. Edison, Inc., Bloomfield, N. J.
 Edison Storage Battery Co., Orange, N. J.
 The Electric Storage Battery Co., Philadelphia, Pa.
 Electric Ry. Improvement Co., Cleveland, Ohio.
 Engineering News, New York.
 Eymon Continuous Crossing Co., Marion, Ohio.
 Fairbanks, Morse & Co., Chicago.
 Fairmont Gas Engine & Railway Motor Car Co., Fairmont, Minn.
 Federal Signal Co., Albany, N. Y.
 Fibre Conduit Co., Chicago.
 Frictionless Rail, Boston, Mass.
 Fowler Conduit Co., Chicago.
 General Electric Co., Schenectady, N. Y.
 General Railway Signal Co., Rochester, N. Y.
 W. & L. E. Gurley, Troy, N. Y.
 Hall Switch & Signal Co., New York.
 Hatfield Rail Joint Mfg. Co., Macon, Ga.
 Hayes Track Appliance Co., Richmond, Ind.
 Hazard Mfg. Co., Wilkes-Barre, Pa.
 Hoeschen Mfg. Co., Omaha, Neb.
 Hubbard & Co., Pittsburgh, Pa.
 Hyatt Roller Bearing Co., Newark, N. J.
 Ingersoll-Rand Co., New York.
 Jennison Wright Co., Toledo, Ohio.
 H. W. Johns-Manville Co., New York.
 O. F. Jordan Co., Chicago.
 Joyce-Cridland Co., Dayton, Ohio.
 Julian-Beggs Signal Co., Terre Haute, Ind.
 Kalamazoo Ry. Supply Co., Kalamazoo, Mich.
 Kellogg Switchboard & Supply Co., Chicago.
 Kelly-Derby Co., Chicago.
 Keppler Glass Construction, Inc., New York.
 The Kerite Insulated Wire & Cable Co., New York.
 Keystone Grinder & Mfg. Co., Pittsburgh, Pa.
 Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
 Kueffel & Esser Co., Chicago.
 Lackawanna Steel Co., Lackawanna, N. Y.
 Lehon Co., Chicago.
 Louisiana Red Cypress Co., New Orleans, La.
 Lufkin Rule Co., Saginaw, Mich.
 M. W. Supply Co., Philadelphia, Pa.
 MacRae's Blue Book Co., Chicago.
 Madden Co., Chicago.
 C. F. Massey Co., Chicago.
 Miller Train Control Corp., Danville, Ill.
 Morden Frog & Crossing Works, Chicago.
 Mudge & Co., Chicago.
 National Carbon Co., Cleveland, Ohio.
 National Concrete Machinery Co., Madison, Wis.
 National Indicator Co., Long Island City, N. Y.
 National Lead Co., New York, N. Y.
 National Lock Washer Co., Newark, N. J.
 National Malleable Castings Co., Cleveland, Ohio.
 George P. Nichols & Bros., Chicago.
 Northwestern Motor Co., Eau Claire, Wis.
 Ogle Construction Co., Chicago.
 Okonite Co., New York.
 O'Malley Beare Valve Co., Chicago.
 Otley Paint Mfg. Co., Chicago.
 Page Woven Wire Fence Co., Monessen, Pa.
 P. & M. Company, Chicago.
 W. W. Patterson Co., Pittsburgh, Pa.
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
 Pocket List of R. R. Officials, New York.
 Positive Rail Anchor Co., Louisville, Ky.
 Protective Signal Mfg. Co., Denver, Colo.
 Pyrene Mfg. Co., New York.
 Q & C Co., New York.
 Rail Joint Co., New York.
 Railroad Supply Co., Chicago.
 Railway Motor Co. of America, Chicago.
 Railway Review, Chicago.
 Ramapo Iron Works, Hillburn, N. Y.
 Reading Specialties Co., Reading, Pa.
 Roadmasters & Maintenance of Way Association.
 Roberts & Schaefer Co., Chicago.
 Safe Lock Switch Machine Co., Lexington, Ky.
 Seller Mfg. Co., Chicago.
 Signal Accessories Co., New York.
 Simmen Automatic Ry. Signal Co., Buffalo, N. Y.
 Simmons-Boardman Publishing Co., New York and Chicago.
 T. W. Snow Construction Co., Chicago.
 Standard Asphalt & Rubber Co., Chicago.
 Southern Pine Association, New Orleans, La.
 Squires-Cogswell Co., Chicago.
 Searchlight Co., Chicago.
 Templeton Kenley & Co., Ltd., Chicago.
 Track Specialties Co., New York.
 Tyler Underground Heating System, Pittsburgh, Pa.
 Toledo Slate Co., Toledo, Ohio.
 Union Switch & Signal Co., Swissvale, Pa.
 U. S. Wind Engine & Pump Co., Batavia, Ill.
 Volkhardt Co., Inc., Stapleton, N. Y.
 Verona Tool Works, Pittsburgh, Pa.
 Wayne Oil Tank & Pump Co., Fort Wayne, Ind.
 Western Electric Co., New York.
 William Wharton, Jr. & Co., Inc., Philadelphia, Pa.
 Waterbury Battery Co., Waterbury, Conn.
 Wyoming Shovel Works, Wyoming, Pa.
 Yale & Towne Mfg. Co., New York.

Pittsburgh Railroad Club

The next meeting of the Pittsburgh Railroad Club will be held on February 23. A paper will be read on "The Effect of Fire Box Design Upon Boiler Capacity and Economy," by J. T. Anthony, assistant to the president of the American Arch Company.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AIR BRAKE ASSOCIATION.—F. M. Nellie, Room 3014, 165 Broadway, New York City. Next annual convention, May 14, 1917, Hotel Chisca, Memphis, Tenn.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—F. A. Pontious, 455 Grand Central Station, Chicago. Next meeting, February 20, New York.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 20-22, 1917, Chicago.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual dinner, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—H. Boutet, Chief Interchange Inspector, Cin'ti Ry's, 101 Carew Bldg., Cincinnati. Regular meetings, 2d Tuesday, February, May, September and November, Hotel Sinton, Cincinnati.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. G. Crawford, C. B. & Q. R. R., 702 E. 51st St., Chicago. Next meeting, May 14-17, Hotel Sherman, Chicago.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 349 Peoples Gas Bldg., Chicago. Next convention, March 19-22, 1917, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—Geo. A. J. Hochgrebe, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—F. C. Stewart, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Pittsburgh Commercial Club Rooms, Colonial-Annex Hotel, Pittsburgh.

RAILWAY DEVELOPMENT ASSOCIATION.—D. C. Welty, Commissioner of Agriculture, St. L., Iron Mt. & So., 1047 Railway Exchange Bldg., St. Louis. Annual meeting, May 9-11, Louisville, Ky.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grand Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Monday in month, except June, July and August, Hotel Sherman, Chicago.

WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

A bill was introduced in the Indiana state senate on February 9, proposing an increase in the intra-state passenger fare from two to two and one-half cents. It was referred to the committee on railroads for consideration.

In a derailment on the Reid-Newfoundland Railroad, near Glenwood, N. F., on the fifth of February, 11 passengers are said to have been killed. One of the three passenger cars took fire and some of the victims were burned.

A bill was introduced in the Missouri state senate on February 8, authorizing the state public service commission to increase passenger fares to three cents a mile, and to raise freight rates 15 per cent. Under the proposed law one-half cent a mile from each passenger fare and two-thirds of the freight rate increase would go to the state.

The Railroad Commission of Arkansas has been petitioned to extend its order of December 18, providing for demurrage rules identical with those temporarily adopted by the Interstate Commerce Commission, to expire on April 30 instead of February 28, for the sake of uniformity with the interstate schedule. This petition will be heard on February 16. The Public Service Commission of Wyoming has postponed its hearing on new demurrage rules from February 9 until February 24.

The Buffalo, Rochester & Pittsburgh has bought a number of automobiles, and the traffic solicitors of the company, both freight and passenger, at the larger agencies, are to use this means of traveling from point to point. These agents have passes over all of the railroads which they have occasion regularly to use, but it is expected that by making them free from the necessity of adapting their plans to the schedules of trains, considerable time will be saved; and also considerable foot travel.

The Southern Railway has received permission from the Alabama Public Service Commission to run its passenger trains between Bessemer and Birmingham over the track of the Alabama Great Southern, abandoning its own circuitous route by way of Ensley and North Birmingham. The Southern will discontinue the use of its own station near Bessemer and will use the new station of the Alabama Great Southern at that place. This shortening of the route will save about 40 minutes in time. Bessemer is 11 miles southwest of Birmingham.

A conference was called at Omaha, Neb., on February 6, for the purpose of considering the equalization of class freight rates between competing Missouri river cities and interior Nebraska points, as suggested by Edgar E. Clark, of the Interstate Commerce Commission, in his opinion in the Missouri river Nebraska cases last year. Traffic officers of the Chicago, Burlington & Quincy, the Missouri Pacific, the Union Pacific, the St. Joseph & Grand Island, and the Chicago, Rock Island & Pacific, and representatives of commercial clubs of Kansas City, Mo., St. Joseph, Sioux City, Iowa; Omaha, Neb.; Fremont and Lincoln, were present at the meeting. The rate adjustment proposed by the railroads was in general satisfactory to all concerned, but in view of such objections as were raised, it was decided to refer the whole matter to the executive officers of the railroads involved.

Western Millers Ask Eastern Roads to Return Cars

A conference of representatives of the western grain and milling interests and transportation officers of both eastern and western roads was held before the Commission on Car Service at Washington on Tuesday to discuss means of securing relief from the conditions faced by the millers because of their inability to secure box cars for eastbound loading. Commissioner McCord and Attorney F. B. Dow of the Interstate Commerce Commission also took part in the conference. The western shippers said that many of their plants were in very serious condition and some of them are facing the necessity of shutting down unless they can secure cars; and many of them complained of discrimination be-

cause, they said, the eastern roads are using western cars for local business on their own lines instead of returning them to the western roads. Western railroad men said that they could do nothing until the eastern roads returned their cars. E. E. Betts, superintendent of transportation of the Chicago & North Western, said that some definite action should be taken at once to begin the movement of empty cars westbound and to open the channel for the eastern movement of flour and other food stuffs even if it were necessary to stop moving munitions and general freight in the east.

A representative of the Chicago, Milwaukee & St. Paul said that western lines had never received the usual amount of cars from eastbound roads for eastbound business this year and that for several weeks the weather northwest of Chicago has been so severe that some days neither freight nor passenger trains could be moved. Representatives of the Great Northern and Northern Pacific said that they had followed the policy of not allowing their cars to go east. Representatives of the eastern lines said that they had done what they could to send cars west and seemed to feel that they had done all that was possible, while Commissioner McCord insisted that the situation could only be met by taking western cars wherever they could be found and moving them west in solid trains regardless of local business.

J. R. Kearney, general superintendent of transportation of the Baltimore & Ohio, described conditions on his line, saying that there was difficulty in securing boats for export movement and that the road had adopted the policy of issuing permits for the movement of grain only on evidence that arrangements had been made for boat accommodations for the freight on arrival. He said the road had been sending cars westward empty for flour movement whenever possible, but that they were sent westward loaded if loads were available for them.

G. H. Alexander, superintendent of car service of the New York Central, described the conditions on his line and said that his road had made every effort to move cars westward, but that it had been necessary to embargo freight from the west for 60 days and to accept grain only from elevators on its lines. In reply to questions by Commissioner McCord, he said it would not be feasible to devote the power now used for local loading to hauling western cars to Chicago, but that the cars were being returned loaded as fast as possible.

A. M. Schoyer, vice-president of the Pennsylvania lines, said that from December 1 to February 2 the Pennsylvania system had returned 10,000 box cars to western roads at a great sacrifice and that now there were more Pennsylvania cars on western lines than foreign cars on its lines. He said that both of the Pennsylvania lines were badly congested and that the Chicago terminals were seriously congested; and that while they would devote special attention to moving food supplies and coal they had gone about as far as they could in the way of returning empty box cars.

Most of the speakers described the effect of the severe weather conditions in recent weeks and said that conditions would be greatly improved by warmer weather. They also hoped for some improvement when the new car service rules are put into effect.

At a conference of the railway officers on Wednesday it was arranged to move daily, from the Twin Cities, beginning next week, a 50-car train of grain for New England and one of flour for Pittsburgh, New York, Philadelphia and New England, the eastern roads to give the western roads an empty car for each loaded car. P. H. McCauley, superintendent of transportation of the Northern Pacific, will have charge of the movement from the northwest, and A. M. Schoyer, vice-president of the Pennsylvania Lines, will be in charge at Chicago.

Minneapolis Passenger Association

The annual meeting of the Minneapolis Passenger Association took place on February 9. The following officers were elected for the ensuing year: President, Otto Thorsen, union depot ticket agent; first vice-president, E. E. Adams, passenger agent, Northern Pacific; second vice-president, in charge of entertainment, H. H. Gould, city passenger agent, Minneapolis, St. Paul & Sault Ste. Marie; secretary, J. J. O'Neil, ticket agent, Minneapolis & St. Louis; treasurer, Stanley Luce, ticket agent, Chicago, Milwaukee & St. Paul.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has further suspended until August 22 the withdrawal by the Chicago & North Western of specific commodity rates on flax tow in carloads from Watertown, S. D., to Chicago and Peoria, Ill., and other destinations.

The commission has further suspended until August 12 the withdrawal by the Pennsylvania lines of an export commodity rate on grain in carloads from Chicago to Newport News and Norfolk, Va., in connection with the Chesapeake & Ohio and Norfolk & Western.

Increase in Petroleum Rates

Opinion by Commissioner Harlan:

Proposed increased rates on petroleum and its products from Louisville, Ky., applicable on interstate traffic, from Cincinnati, Ohio, St. Louis, Mo., and other points to stations in Kentucky, are found to have been justified. (43 I. C. C., 35.)

Lumber from Oklahoma

Opinion by Commissioner Harlan:

Proposed advances on hardwood lumber to the basis of the yellow-pine rates from points on the St. Louis-San Francisco and on the Texas, Oklahoma & Eastern, in the state of Oklahoma, to points west of the Mississippi river, and also the proposed advances in both hardwood and yellow-pine rates to basis of the "Thebes combination" from the same territory to points east of the Mississippi river, are found justified.

Proposed advances on yellow-pine lumber to the basis of the hardwood rates from points in Oklahoma and Arkansas north of the yellow-pine blanket to points east of the Mississippi river, are not found to be justified. (42 I. C. C., 567.)

Rates on Paper from Michigan

Michigan Paper Mills Traffic Association et al. v. Alabama & Vicksburg et al. Opinion by Commissioner Meyer:

The commission finds that the rates on printing paper and wrapping paper from Kalamazoo, Plainwell, Otsego and Vicksburg, Mich., to points in central freight association territory, including all points in Ohio and Indiana, are prejudicial to complainants as compared with the rates on the same commodities from points in the Fox river and Wisconsin river groups in Wisconsin. It further finds that this prejudice would be removed if the rates on printing paper and wrapping paper from the Fox river and Wisconsin river groups to the destinations in question were constructed on the lowest combinations available. (43 I. C. C., 16.)

STATE COMMISSIONS

The Railroad Commission of Louisiana, on February 8, imposed a fine of \$5,000 on the Texas & Pacific for failing to comply with its order of December 3, 1913, which required the installation of an approved block system between New Orleans, La., and the Louisiana-Texas state line. According to the provisions of the order the block system was to be such as would reasonably conserve the safety of life and property, and was to be installed at the rate of not less than 20 miles a year, beginning January 1, 1914, until the entire line was signaled.

COURT NEWS

Punitive Damages

In an action for actual and punitive damages, through wrongful acts of the railroad, to an interstate shipment of horses and mules, the South Carolina Supreme Court holds that under the Carmack Amendment, which governs interstate shipments, punitive damages are not recoverable for such wrongful acts.—*Hartman v. Southern (S. Car.), 90 S. E., 1023.*

Contributory Negligence of Employee

The California Supreme Court holds that if an experienced brakeman and switchman after throwing a switch left his position of safety, not in the performance of any duty, and climbed on the side of a moving box car when near a leaning drawbridge, which he knew came dangerously near the car, and was struck thereby and killed, he took a visible unnecessary risk, and was negligent as a matter of law.—Bontz v. San Pedro, Los Angeles & Salt Lake (Cal.), 161 Pac., 371.

When "Transportation" Begins

In view of section 1 of the interstate commerce act, including in an interstate shipment everything from an order for cars to final delivery under the term "transportation," the Texas Court of Civil Appeals holds that damages to an interstate shipment of cattle occasioned by a delay at pens before starting falls within the terms of a contract of shipment requiring notice of claim for loss or injury by delay in "transportation" as a condition precedent to recovery.—Rock Island v. Whaley (Tex.), 190 S. W., 833.

Expense of Safety Appliances at Grade Crossing

The Washington statute relating to the establishment of new grade crossings and damages provides that where railroads of different companies cross each other at grade the part of the expense of making the crossing not chargeable to any municipality shall be apportioned between the railroad companies unless they mutually agree thereon, and that, if an apportionment is necessary, the public service commission shall hold a hearing thereon. In proceedings by a railroad for permission to cross another railroad at grade the Washington Supreme Court holds that a railroad in course of construction permitted to cross an existing road at grade and declared liable for the entire expense of the crossing, was not liable for the entire expense of the safety appliances ordered by the commission (an interlocking machine and appurtenances), but this should be apportioned equally between the two railroads.—State ex rel. Puget Sound & Willapa Harbor v. Northern Pacific (Wash.), 161 Pac., 850.

Free Passes to California Railroad Commission and Its Employees

The California Supreme Court holds that neither the Superior Court, nor any other court of the state except the Supreme Court, has any power to enjoin the railroad commission or render any judgment that would interfere with it in the performance of its official duties; and hence the Superior Court has no right on the suit of a stockholder to enjoin a railroad company and its directors from complying with the provisions of section 11 of the California public utilities act, providing for free passes on railroads for the commission and its officers and employees.—Sexton v. A. T. & S. F. (Cal.), 161 Pac., 748.

Interstate Shipment Diverted

A shipment of grain from a point in Kansas consigned to a point in Missouri was sold by the consignee to a dealer for delivery in Kansas before it had reached the state line. But it was taken across the state line and back to an elevator in Kansas, where it was unloaded. The Kansas Supreme Court holds, in an action for the loss of a portion of the shipment, that it constituted interstate commerce, and Kansas state statutes relied on by the plaintiff were not available.—Andrews v. Union Pacific (Kan.), 161 Pac., 600.

Written Contract Supersedes Prior Oral Agreement

In an action for damages for shrinkage of an interstate shipment of live stock, the shipping contract stipulated for notice of claim of damage before removal. No such notice was given. The plaintiff averred that this contract was presented to him for signature when the train was ready to start, when he had not time to read it; that he was led to believe the shipment would not move unless he signed the contract, and that he thought it was for transportation for himself and caretaker. He contended that his shipment was in reality made under a verbal contract consummated before the written contract was signed, and that he was not bound by the latter. The Texas Court of Civil Appeals held that the written contract for an interstate shipment contemplated by the Carmack amendment, being free from

fraud, prevails over the precedent oral contract, so that provision of the written contract for notice of claim of damages, if reasonable, controls. Judgment for the plaintiff was reversed.—Panhandle & Santa Fe v. Bell (Tex.), 189 S. W., 1,097.

Exemption from Liability from Fire from Engines

A lease of a portion of a right of way for a manufacturing plant provided that the railroad should not be liable for damage by fire communicated from its locomotives, though the result of negligence. It provided that on termination of the lease, according to an option reserved to either party, the lessee should remove at once from the premises all structures and property not belonging to the road. The plant with its contents was destroyed by fire from the company's locomotives after the termination of the lease by the lessee, who had continued in possession of the premises, without any new lease or new arrangement as to possession. The Federal District Court for the southern district of Iowa holds that by continuing in possession in violation of his covenant to remove, the lessee was bound by his covenant freeing the railroad from liability for fires from locomotives. The contents of the plant were mortgaged, and the mortgagee had no notice actual or constructive of the lease or the exemption. It was held that the mortgagee might recover from the railroad where the mortgaged property was burned through the company's negligence; that the covenant should be construed merely as a contract of indemnity—an agreement by the lessee to indemnify the railroad for any loss it might sustain by reason of being held liable for negligence, which resulted in the destruction of property on the leased premises.—Milton Mfg. Co. v. C. B. & Q., 237 Fed., 118.

Termination of Relation of Passenger and Carrier

A passenger, who had paid his fare between certain points on the line, left the train during a short stop at an intermediate station, and went to a restaurant a block and a half away for refreshments. When he returned to the station he found that his train had gone. He took passage on a freight train without payment of fare, with the consent of the engineer, riding on a platform car loaded with rock, from which he was thrown by a violent jerk of the train, and injured. He sued the company, contending, first, that the relation of passenger and carrier existed at the time of injury; and, second, that if he were a trespasser he was entitled to recover because of the company's wilful negligence. The Minnesota Supreme Court held (1) that the relation of passenger and carrier ceased on the plaintiff's failure to return to the station in time to resume his journey on the train, and that he had no right as a matter of law to continue the journey on some other train without further payment of fare; and (2) that he was not a passenger while riding on the freight train. The engineman was without authority to accept him as a passenger, and he was in fact and law a trespasser thereon. The evidence did not require the submission of the case to the jury on the question of wilful negligence. Judgment for the defendant on a directed verdict was affirmed.—Tuder v. Oregon Short Line (Minn.), 160 N. W., 785.

UNITED STATES SUPREME COURT**Common Carrier Must Carry Passengers**

The Supreme Court of the United States has affirmed the judgment of the Supreme Court of Appeals of the State of West Virginia (75 W. Va., 100), upholding as not unreasonable an order of the public service commission of that state requiring the Chesapeake & Ohio to install and maintain upon a branch line in that state a passenger service consisting of two passenger trains daily each way. The branch line in question is a standard gage line from MacDougal and Hawkes Nest on the main line along the Kanawha river about two miles to Austed, and a mile further to extensive coal mines. Hitherto it has been used for freight traffic only. It is held that the act whereby the company was granted the right to construct and operate the branch line did not leave it free to devote it to freight service only or to passenger service only, and the duty to carry passengers could not be avoided merely because it would be attended by some pecuniary loss. That there would be such a loss, however, is of course a circumstance to be considered in passing upon the reasonableness of such an order, but is not the only one.—Chesapeake & Ohio v. P. S. Commission. Decided February 5, 1917.

Railway Officers

Executive, Financial, Legal and Accounting

L. S. Taylor, treasurer of the Pullman Company, with office at Chicago, Ill., has been elected controller, a newly created position. He will be succeeded as treasurer by A. A. Cummins.

H. I. Kittlesby, senior accountant in the office of the auditor of the Southern Pacific at San Francisco, Cal., has been appointed auditor of the San Diego & Arizona, with headquarters at San Diego, Cal.

J. H. R. Parsons, whose election as vice-president and general manager of the Southern Pacific, Louisiana Lines, was announced in these columns two weeks ago, entered railway service on January 1, 1880, with the Chicago & Grand Trunk as a clerk in the treasurer's office at Port Huron, Mich. Later he was transferred to the stores department at Detroit, Mich. On April 1, 1886, he took employment in the stores department of the Union Pacific at Omaha, Neb., and up to July 1, 1906, he served also in the auditing and passenger departments. On July 1, 1906, he was appointed chief clerk to the assistant director of traffic for the combined Union Pacific-Southern Pacific lines, with headquarters at Chicago, Ill. From January 1, 1909, to January 1, 1916, he was general passenger agent of the Southern Pacific lines, with office at New Orleans, La., being at this latter date appointed general passenger agent of this company's Louisiana and Texas lines, with office at Houston, Tex., the position he held at the time of his recent election, as noted above.

William Henry Gatchell, who has been appointed assistant to vice-president of the Southern Railway System, with headquarters at Washington, D. C., was born on April 3, 1862, in Florida, and was educated in the common schools at Selma, Ala. He began railway work in 1873 as a messenger boy on the Selma, Rome & Dalton, now a part of the Southern Railway, and later served as clerk until 1885. The following year he was made a agent at Tuscaloosa, Ala., of the Memphis & Charleston, now a part of the Southern Railway. One year later he was transferred in the same capacity to Memphis, Tenn. From 1903 to 1905 he was chief traveling auditor of the Southern Railway, with headquarters at Washington, D. C. He subsequently served as superintendent of the Nashville division at Nashville, Tenn., and from 1907 to 1912 as superintendent of transfers at Washington, D. C. He was then appointed superintendent of agencies of the same road,



J. H. R. Parsons



W. H. Gatchell

which position he held at the time of his recent appointment as assistant to vice-president of the Southern Railway System, as above noted.

The executive officers of the Gulf, Mobile & Northern, formerly the New Orleans, Mobile & Chicago, are now as follows: John W. Platten, chairman of the board, with headquarters at New York; W. F. Owen, president, at Mobile, Ala.; H. F. Ricker, assistant to president and secretary, at Mobile; H. M. Hood, vice-president and controller, at Mobile; C. H. Murphey, assistant secretary, at New York; Eugene Harvey, treasurer, at Mobile; W. H. Duffee, assistant treasurer, at Mobile; J. C. Rich, general solicitor, at Mobile; and Flowers & Brown, special counsel, at Jackson, Miss.

Charles Magaw, whose appointment as assistant general attorney of the Union Pacific, with headquarters at Omaha, Neb., was announced in these columns last week, was born in Preble County, Ohio, on August 15, 1872. He entered Washburn College at Topeka, Kan., in 1890, and in 1896 took up the study of law at the University of Kansas. For several years, beginning in 1897, he was engaged in the private practice of law, following which he became an attorney for the Union Pacific at Topeka, Kan. As assistant general attorney at Omaha, he succeeds B. A. Scandrett, resigned to take a similar position with the Great Northern.

Gustavus H. Gray, whose election as president of the Union Depot Bridge & Terminal Railroad Company, and affiliated companies, with headquarters at Kansas City, Mo., was mentioned in these columns on January 19, was born at Jonesburg, Mo., on May 4, 1871. Shortly after graduating from Central College at Fayette, Mo., he entered railway service in December, 1891, as a clerk in the general freight agent's office of the Chicago, Burlington & Quincy at St. Louis, Mo. From 1896 to 1899 he was chief rate clerk in this same department, and from 1899 to 1902 was chief clerk to the general southwestern agent at Kansas City, Mo. In 1902 he was appointed traveling freight agent, with office at Kansas City, and in 1910 was

promoted to assistant industrial agent, with headquarters at Chicago, Ill. From October, 1907, to March, 1908, he was made acting industrial agent at Chicago, and from March, 1908, to November, 1909, he was chief clerk to the assistant general freight agent at Kansas City. In November, 1909, he was appointed commercial agent at St. Louis, Mo., which latter position he held until February 1, 1917, when his election to his present position, as noted above, became effective. He succeeds Frederick W. Pratt, resigned to give closer attention to personal interests. The Union Depot Bridge & Terminal Railroad Company is owned by a syndicate controlled by the Armour-Swift-Burlington interests.



G. H. Gray

Operating

E. C. Potter has been appointed chief despatcher of the Grand Trunk, with office at Richmond, Que., vice T. H. Mason.

John C. Fields has been appointed assistant trainmaster of the Pittsburgh & Shawmut, with headquarters at Kittanning, Pa.

E. H. Bunker has been appointed assistant to the general superintendent, of the Evansville & Indianapolis, with headquarters at Terre Haute, Ind.

M. A. Wallace, assistant chief train despatcher of the Southern Pacific at San Francisco, Cal., has been appointed chief train despatcher of the Shasta division, succeeding C. G. Beath, transferred.

J. Woodman has been appointed superintendent of the Montreal Terminal division of the Canadian Pacific, with office at Outremont, Que., in place of C. J. Kavanagh, transferred.

C. E. Johnston, chief engineer of the Kansas City Southern, with office at Kansas City, Mo., has been appointed general manager, a newly created position, with the same headquarters.

E. B. Moffatt has been appointed chief inspector of the weighing and inspection bureau of the Delaware, Lackawanna & Western, with office at Scranton, Pa., vice A. E. Staub, promoted.

W. T. Sadler, superintendent of the Chicago, Burlington & Quincy at Casper, Wyo., has been appointed superintendent of the Creston division, with headquarters at Creston, Iowa, vice N. C. Allen, transferred.

E. D. Hogan, general superintendent of the New Orleans, Mobile & Chicago, at Laurel, Miss., has been appointed general manager of its successor, the Gulf, Mobile & Northern, with headquarters at Laurel, Miss.

J. J. Powers has been appointed trainmaster of the Baltimore & Ohio, with office at Lorain, Ohio, and T. E. Jamison, has been appointed trainmaster at Garrett, Ind., succeeding W. L. Campbell, who has been transferred.

N. C. Allen, superintendent of the Creston division of the Chicago, Burlington & Quincy, with offices at Creston, Iowa, has been appointed superintendent of the Casper division, with headquarters at Casper, Wyo., succeeding W. T. Sadler, transferred to Creston, effective February 15.

J. H. Boyle, who has been acting as general superintendent of the Quebec district of the Canadian Pacific at Montreal, Que., during the temporary absence of the general superintendent of the Ontario district, due to illness, has resumed his duties as superintendent of the Farnham division.

J. C. Roth, trainmaster of the Northern Pacific at North Yakima, Wash., has been appointed terminal trainmaster, with headquarters at Pasco, Wash., succeeding E. J. Moran, who is appointed trainmaster at North Yakima, Wash. W. S. Fitz has been appointed trainmaster, with headquarters at Pasco, Wash.

T. J. Jones, superintendent of transportation of the Wabash, with office at St. Louis, Mo., has been appointed general superintendent, with the same headquarters, a newly created position. He will be succeeded as superintendent of transportation by M. B. Casey, superintendent of car service of the Delaware, Lackawanna & Western, at Scranton, Pa.

F. J. Easley, assistant general manager of the Denver & Rio Grande, Colorado lines, with office at Denver, Colo., has been appointed general manager of the entire system, with the same headquarters, succeeding J. Russell, recently resigned to accept service with another company. The office of assistant general manager, Colorado lines, has been abolished.

Henry J. Moore, whose appointment as general inspector of transportation of the Atchison, Topeka & Santa Fe, with office at Newton, Kans., has already been noted in these columns, was born in Scott County, Ky., August 4, 1885. He began railway work in August, 1908, with the Atchison, Topeka & Santa Fe as a chainman in the engineering department at Arkansas City, Kans. From April to June, 1909, he was rodman at Chanute, Kans., and from June, 1909, to May, 1913, he served as transitman and in other similar capacities in the engineering department. In May, 1913, he was appointed division engineer, with headquarters at Arkansas City, which position he held at the time of his present appointment as general inspector of the western district, eastern lines, as noted above. This is a newly created position.

Traffic

J. B. Garvey has been appointed commercial agent of the Queen & Crescent Despatch, with office at New Orleans, La.

W. T. Treleaven has been appointed general livestock agent of the Atchison, Topeka & Santa Fe, with office at Kansas City, Mo., succeeding F. S. Brooks, recently resigned to engage in other business.

E. G. Chesbrough, formerly traveling passenger agent of the Canadian Pacific, with office at New York City, has been ap-

pointed general agent, passenger department, in charge of southeastern territory, with headquarters at Atlanta, Ga.

C. W. Westbury, general agent of the Southern Railway System at Washington, D. C., has been appointed general traveling passenger agent, with office at Philadelphia, Pa.; R. H. DeButts, division passenger agent at Charlotte, N. C., has been transferred in the same capacity to Washington; and S. E. Burgess, division passenger agent at Philadelphia, has been transferred in the same capacity to Charlotte.

J. P. Tocher, general agent of the Queen & Crescent Route, at Lexington, Ky., has been appointed district freight agent of the Southern Railway System, with headquarters at Lexington, and the following have been appointed commercial agents of the Southern Railway System; A. H. Fulkerson, at Columbus, Ohio; C. S. Powers, at Seattle, Wash.; E. W. Mihm, at Pittsburgh, Pa.; H. E. Freund, at West Detroit, Mich.; F. W. Fairbairn, at Cleveland, Ohio; W. H. Timberlake, at Birmingham, Ala., vice A. B. Collins, promoted; J. W. Piatt, at Meridian, Miss., and J. S. Brittain has been appointed commercial agent of the Southern Railway System, also of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, with headquarters at Los Angeles, Cal.

Edwin Norton Aiken, whose appointment as general passenger agent of the Southern Railway System, Lines West, with headquarters at Cincinnati, Ohio, has already been announced in these columns was born on October 8, 1878, at Cincinnati and was educated in the public schools of his native town and at Normal School at Geneva, Ohio.



E. N. Aiken

He began railway work in March, 1896, with the New York Central & Hudson River at New York City. On August 1, 1902, he was appointed rate clerk in the passenger department, of the Queen & Crescent Route, at Cincinnati, Ohio. In November, 1912, he was promoted to assistant general passenger agent at the same place, which position he held at the time of his recent appointment as general passenger agent of the Southern Railway System, Lines West, as above noted.

F. D. Claggett, whose appointment as general freight agent of the Southern Railway System, with headquarters at Cincinnati, Ohio, has already been announced in these columns, was born on August 14, 1874, at Hagerstown, Md., and was educated in Washington County High School. He began railway work in September, 1891, in the auditor's office of the Norfolk & Western. In November, 1895, he entered the service of the Southern Railway in the office of the freight traffic department at Washington, D. C., and on March 1, 1897, he went to the Cincinnati, New Orleans & Texas Pacific, at Cincinnati, Ohio. On June 1, 1912, he was promoted to assistant general freight agent of the same road, which position he held at the time of his recent appointment as general freight agent of the Southern Railway System, as above noted.

Fred S. Reigel, who has been appointed assistant general freight agent of the Southern Railway System, with headquarters at Cincinnati, O., was born on April 21, 1879, at Louisville, Ky., and was educated in the public schools of his native town. He began railway work on August 8, 1899, as a messenger in the local office of the Southern Railway at Louisville, and later in the same year was promoted to assistant rate and bill-of-lading clerk. On July 1, 1901, he was appointed chief rate clerk; then in March, 1905, he was promoted to rate clerk in the general freight office. In March of the following year he was made chief clerk to assistant general freight agent, and in December, 1911,

he became assistant chief clerk to assistant freight traffic manager. He subsequently served as chief clerk to the same officer until January, 1916, when he was appointed acting assistant general freight agent, and now becomes assistant general freight agent at Cincinnati, O., of the Southern Railway System, as above noted. Mr. Reigel's entire railway service until his recent appointment has been with the Southern Railway at Louisville, Ky.

James Edward Fitzwilson, who has been appointed general freight agent of the Southern Railway System, with headquarters at New York, as has already been announced, was born on August 21, 1869, at Richmond, Va., and was educated in the grammar schools of his native town. He began railway work as a clerk in the general freight office at Richmond, of the Richmond & Danville, now a part of the Southern Railway. He was promoted in 1896 to chief clerk to the division freight agent, and the following year to traveling freight agent, with office at Raleigh, N. C. From 1898 to 1900, he served as chief clerk to general agent, first at Norfolk, Va., and then at New York. In 1900 he was appointed soliciting agent of the Asheville Line, leaving the service of the Southern Railway in February, 1902, to become commercial agent of the Norfolk & Western at Columbia, S. C. On April 1, 1904, he returned to the service of the Southern Railway as chief clerk to the general agent at New York; in January of the following year he was promoted to New England agent at Boston, Mass., and since April, 1914, served as general agent of the Southern Railway and the Piedmont Air Line at New York, until his recent appointment as general freight agent of the Southern Railway System, as above noted.

Edward Harrison Shaw, who has been appointed freight traffic manager of the Southern Railway, with headquarters at Atlanta, Ga., as has already been announced in these columns, was born on January 8, 1870, at Philadelphia, Pa., and was educated in private schools and at Berkeley Military Academy, New York City. He began railway work in 1889, as rodman, and later served in the engineer corps on the Ohio & Northwestern, now a part of the Norfolk & Western, at Cincinnati, O. He subsequently served successively in clerical positions in the auditing and traffic departments of the same road. From 1891 to 1893 he was chief clerk in the general freight and passenger office at Cincinnati, and then to 1895 he was local agent of the same road at Portsmouth, Ohio. He was promoted to general agent in 1895, remaining in that position until 1901, and then to 1903 was general freight and passenger agent of the South Carolina & Georgia Extension Railway, now a part of the Southern Railway, at Blacksburg, S. C. From June, 1903, to December of the following year he was division freight agent and executive general agent of the Detroit Southern, at Ironton, Ohio. In December, 1904, he was appointed division freight agent of the Southern Railway at Greensboro, N. C., and in September of the following year was promoted to assistant general freight agent at Birmingham, Ala. From April, 1907, to August, 1908, he served as general freight agent at Charleston, S. C. In August, 1908, he was appointed assistant freight traffic manager at Washington, D. C., and in June, 1911, was transferred in the same capacity to Atlanta, Ga., which position he held at the time of his recent appointment as freight traffic manager of the same road as above noted.

Engineering and Rolling Stock

C. M. Thompson has been appointed division engineer, Colorado division of the Union Pacific, with headquarters at Denver, Colo., vice Geo. F. Davis.

C. Kelso has been appointed master mechanic of the Grand Trunk, Stratford shops, with headquarters at Stratford, Ont., succeeding R. Patterson, resigned.

J. C. Ramage, superintendent of tests of the Southern Railway Company proper, has been appointed superintendent of tests of the Southern Railway System, with headquarters at Alexandria, Va.

F. W. Rhuark, master mechanic of the Baltimore & Ohio at Garret, Ind., has been appointed master mechanic at Cleveland, Ohio, succeeding J. F. Gethins; W. F. Moran, master mechanic at Newark, succeeds Mr. Rhuark, and A. E. McMillan, master mechanic at Glenwood, Pittsburgh, Pa., succeeds Mr. Moran.

C. M. Ratliff, assistant engineer of maintenance of the Southern Railway, at Washington, D. C., has been appointed office engineer of the Southern Railway System, with headquarters at Washington, D. C.

L. W. Duffee, chief engineer of the Meridian & Memphis, at Mobile, Ala., has been appointed special engineer, with office at Mobile, of the Gulf, Mobile & Northern, formerly the New Orleans, Mobile & Chicago.

Hugh B. Holmes, resident engineer of the Kansas City, Mexico & Orient at Kansas City, Mo., has been appointed chief engineer, with headquarters at Kansas City. He was born on July 13, 1875, at Ferris, Ill., and after leaving high school he attended commercial college, also the Iowa City academy and the State University of Iowa. In 1899 he began railway work as a rodman on construction work with the Chicago, Burlington & Quincy. The following year he entered the service of the Kansas City, Mexico & Orient as topographer on preliminary surveys in the state of Chihuahua, Mexico. He subsequently served as levelman and transitman on location surveys of the same company. In 1904

he was appointed resident engineer on construction for the first section of about 12 miles of the La Junta-Temosochic extension of the Chihuahua & Pacific, now a part of the Mexico North Western. In 1905 he returned to the service of the Kansas City, Mexico & Orient as chief clerk and assistant to the superintendent of construction at Chihuahua, Mex., remaining in that position until 1909. He then served for one year in Texas, and later was transferred to the chief engineer's office of the same company at Kansas City as chief clerk. In 1912 he was appointed resident engineer in charge of the engineering department by the receivers. He served in that capacity through the receivership, which terminated in 1914, and with the new company in the same capacity until his appointment on February 1, as chief engineer of the same road, with headquarters at Kansas City, as above noted.

Purchasing

R. Lordan has been appointed purchasing clerk of the Evansville & Indianapolis, with headquarters at Terre Haute, Ind.

OBITUARY

E. C. Lewis, chairman of the board of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., died on February 13 at Nashville.

W. D. Minton, for the past 27 years master car builder of the Texas & Pacific, with headquarters at Marshall, Tex., died at his home in that city February 5, age 69 years.

Archibald Buchanan, Jr., chief of equipment division in the valuation department of the New York Central at New York, died on February 5. He was born in New York City in 1870, and received his education in the public schools and Cooper Union. In 1890 he entered the service of the New York Central at West Albany, N. Y., as chief draughtsman in the locomotive department, and later became foreman of the machine shop. From 1900 to 1903 he was master mechanic with the Delaware & Hudson at Green Island. He then went to St. Albans, Vt., as superintendent of motive power for the Central Vermont, returning to Albany in 1907 as chief of equipment division, with the Second district of the New York Public Service Commission. In 1913 he again entered active railway service as chief of equipment division in the valuation department of the New York Central Lines, with headquarters at Grand Central Terminal, New York.



H. B. Holmes

Equipment and Supplies

LOCOMOTIVES

THE CANADIAN PACIFIC has authorized the construction of 25 locomotives at its Angus shops.

THE BELT RAILWAY OF CHICAGO is inquiring for 5 Santa Fe type locomotives for hump yard service.

THE NORTHERN RAILWAY OF FRANCE has ordered 50 Mikado locomotives from the Baldwin Locomotive Works.

WORTH BROTHERS, Coatesville, Pa., have ordered 2 four-wheel locomotives from the Baldwin Locomotive Works.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for a second-hand ten-wheel or Consolidation locomotive, with 22-in. cylinders and a tractive effort of about 40,000 lb.

THE COPPER RIVER & NORTHWESTERN has ordered one Mikado locomotive from the American Locomotive Company. This locomotive will have 20 by 28-in. cylinders, and a total weight in working order of 195,000 lb.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of December 26 as having issued inquiries for locomotives, has ordered 12 Santa Fe and 7 Pacific type locomotives from the Baldwin Locomotive Works.

THE ELGIN, JOLIET & EASTERN has ordered 8 Mikado and 8 eight-wheel switching locomotives from the American Locomotive Company. The Mikado locomotives will have 28 by 30-in. cylinders, and a total weight in working order of 312,000 lb. The eight-wheel switching locomotives will have 24 by 28-in. cylinders, and a total weight of 216,000 lb.

THE DANISH STATE RAILWAYS have issued tenders and specifications in this country and abroad for the purchase of considerable quantities of crucible steel tires, of tires made of Siemens-Martin steel, of mild steel boiler tubes and of wheels on axles for cars. The tenders are being issued through the Danish consul-general, 8-10 Bridge street, New York.

THE NEW YORK CENTRAL was recently reported as having ordered 60 locomotives from the American Locomotive Company and 90 from the Lima Locomotive Works. Details of the latter order were given in last week's issue. The 60 engines ordered from the American Locomotive Company include 45 Pacific and 5 Mikado locomotives for the New York Central itself, and 10 Pacific type locomotives for the Michigan Central.

THE ILLINOIS CENTRAL reported in last week's issue as contemplating the purchase of locomotives, has ordered 20 switching and 20 Pacific type locomotives from the American Locomotive Company and 35 Mikado locomotives from the Baldwin Locomotive Works. The Pacific type locomotives will have 26 by 28-in. cylinders, and a total weight in working order of 278,000 lb. The switchers will be six-wheel engines, and will have 21 by 26-in. cylinders, and a total weight in working order of 170,000 lb.

FREIGHT CARS

THE CENTRAL OF GEORGIA is in the market for 1,000 cars.

THE TEXAS & PACIFIC has withdrawn its inquiry for freight cars.

THE PERE MARQUETTE has revived its inquiry for 1,000 box cars.

THE DULUTH & IRON RANGE is inquiring for 50 gondola, 25 box, 25 flat and 10 refrigerator cars.

THE CUDAHY REFRIGERATOR LINE has ordered 250 center constructions from the American Car & Foundry Company.

PASSENGER CARS

THE CHICAGO, BURLINGTON & QUINCY has ordered 15 70-ft. coaches from the American Car & Foundry Company.

THE PENNSYLVANIA EQUIPMENT COMPANY, Philadelphia, Pa., is in the market for several second-hand 36-in. gage coaches.

THE PHILADELPHIA & READING, reported in last week's issue as contemplating the purchase of 50 passenger cars, has issued inquiries for 40 62-ft. coaches and 10 62-ft. passenger and baggage cars for suburban service.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of January 12 as being in the market for passenger cars, has ordered 5 dining cars, 16 coaches, 5 combination baggage and express cars and 2 combination passenger and baggage cars from the Pullman Company.

THE INTERBOROUGH RAPID TRANSIT, reported in the *Railway Age Gazette* of December 15 as contemplating the purchase of a large number of subway cars, has now issued inquiries for 217 motor and 93 trailer cars, and asks an option on an additional 120 motor and 47 trailer cars, to be exercised within six months.

IRON AND STEEL

THE GREAT NORTHERN has placed an order for 6 oil tanks, 168 tons, at various locations.

THE PULLMAN COMPANY has ordered 263 tons of steel from the McClintic Marshall Company for a truck shop.

THE UNION RAILWAY EQUIPMENT COMPANY has placed an order for 102 tons of steel for miscellaneous construction at Michigan City, Ind.

THE WESTERN PACIFIC has ordered 900 tons of steel from the McClintic, Marshall Company for 3 200-ft. riveted spans, and one 60-ft. through girder span at Sacramento, Cal.

MISCELLANEOUS

THE PENNSYLVANIA RAILROAD has awarded a contract to the Roberts & Schaefer Company, Chicago, for the designing and building of a 1,200-ton, two-track, coaling plant, with two "RandS" gravity sand plants, of timber construction, to be built immediately at Pitcairn, just east of Pittsburgh, Pa., and a 200-ton automatic electric coaling plant for Allegheny engine house.

THE LEHIGH VALLEY has awarded a contract to the Roberts & Schaefer Company for the building of a large 1,200-ton capacity reinforced concrete and steel, counterbalanced bucket, locomotive coaling plant, for installation at Manchester, N. Y., including a concrete "RandS" gravity sand plant, arranged with duplicate hoisting equipment, and "RandS" measuring coal loaders for issuing and recording all coal passing to locomotives on six tracks.

NEW LINE IN INDIA UNDER SURVEY.—The government of India has sanctioned a survey by the Baroda Durbar for a meter gage railway between Kalol, a station on the Rajputana-Malwa Railway and Viramgam, a station on the Bombay Baroda and Central India Railway, a distance of about 29 miles.

COAL PRODUCTION IN FRANCE.—French coal production has fallen from 40,000,000 tons in 1913 to 20,000,000 tons in 1915, owing to German occupation of coal regions. Consumption before the war was 60,000,000 tons annually, the 20,000,000-ton shortage being supplied three-fourths by England. Price of 15.51 francs per ton, before the war, is now from 25 to 45 francs for domestic, and 150 francs for foreign coal.—*Report of the American Industrial Commission of the American Manufacturers' Export Association*.

RAILWAY CONSTRUCTION IN RUSSIA.—A recent issue of the Commerce Reports quotes a Russian authority to the effect that the committee for the construction of new railways in Russia has decided on the construction of new lines, as follows: In the Caucasus the line from Grachi to Tikhoretskaya is to be undertaken first, and then lines from Tikhoretskaya to Byelorechenskaya and from Novogeorgievsk to Orel. In Siberia the Kostroma-Krasnoufimsk-Ufalei-Ishim-Tomsk line is to be constructed first. In southern Siberia a line from Orsk to Akmolinsk and Pavlodar is to be built, with a branch from Akmolinsk to Semipalatinsk. In the Lena region the Irkutsk-Ust-Igli line is to be built first.

Supply Trade News

A. Hazlehurst has been appointed sales agent of the American Steel Foundries, with headquarters at Pittsburgh, Pa.

H. M. Green has been appointed railroad sales representative of the Barrett Company, New York, with headquarters at 1131 Reedsdale street, Pittsburgh.

Fred S. Hiland, formerly with the Patton Paint Company, Milwaukee, Wis., has been appointed a railroad representative for the Wadsworth-Holland Company, Chicago.

Thomas E. Litchfield, formerly with the railway department of the McCord Manufacturing Company, Detroit, Mich., has resigned to enter the service of the Dayton Manufacturing Company, Dayton, Ohio.

Asa Colton has left the department of interstate commerce of the LaSalle Extension University, Chicago, to become assistant director of the International Commerce Service of the International Correspondence Schools, Scranton, Pa. He will have headquarters at Washington, D. C.

The Modern Tool Company, Erie, Pa., manufacturers of the line of "Modern" grinding machines and threading tools, announces that H. L. Harrison has joined its mechanical staff, with the position of factory manager. Mr. Harrison was formerly connected with the Packard Motor Car Company, the Maxwell Briscoe Company, and the American Car & Foundry Company.

The National Railway Time Service Company, Chicago, Ill., has closed contracts for its time service on the Erie; the New York, Susquehanna & Western; the Chicago, Indianapolis & Louisville; the Elgin, Joliet & Eastern; the Chicago & Western Indiana; the Belt Railway of Chicago; the Chicago Junction; the Chicago River & Indiana; the Mobile & Ohio; the Southern of Mississippi; the Seaboard Air Line; the Pere Marquette; the Trans-Mississippi Terminal, and the Texas & Pacific.

J. Leonard Replogle, who, with his associates, recently purchased control of the Wharton Steel Company, has been elected chairman of the board. Other officials are: H. S. Endsley, president and treasurer; I. Townsend Burden, vice-president; Ernest Hillman, vice-president; H. C. Wenner, secretary, and F. B. Dutton, general superintendent. Directors: J. L. Replogle, H. S. Endsley, Harry Payne Whitney, Charles MacNeill, James J. Flannery, J. Rogers Flannery, L. W. Baldwin, I. Townsend Burden and L. G. Waring.

General George W. Goethals announces that he has opened consulting offices in the Wall Street Exchange building, 43 Exchange Place, New York. He has associated with him experienced specialists, and will engage in a general consulting practice in civil, electrical, mechanical and hydraulic engineering. Special attention will be given to examinations and reports on canals, harbors, dry docks, terminals, dams, water power development, water supplies, purification of tropical waters, refrigeration, reinforced concrete structures, organizations, management and public utilities.

A fire in the Union Switch & Signal Company's plant at Swissvale, Pa., on the night of February 10 completely destroyed the machine and erecting departments, causing a loss of about \$4,000,000. The shell making shops were not damaged. President A. L. Humphrey has announced that the machinery in them will be put to use on the company's regular output. The machines as used in the manufacture of shrapnel shells are of the same character as that for switch and signal work. The shell contract having been completed leaves the machinery available for the manufacture of the regular products.

The American Car Roof Company, Chicago, announces that it has given the following car building companies shop rights to build and apply the Christy roof to freight cars when specified by railway companies: The American Car & Foundry Company, the Cambria Steel Company, the Haskell & Barker Car Company, the Mount Vernon Car Manufacturing Company, the

Pressed Steel Car Company, the Pullman Company, and the Standard Steel Car Company. The car builders will absorb the royalty charge, remitting to the American Car Roof Company for the number of roofs built. The Christy roofs are of two types, the all-steel and the insulated steel.

The Combustion Engineering Corporation, 11 Broadway, New York City, announces the doubling of the size of its New York offices. This change was made to accommodate the increase in business due to the constantly increasing demand for its Type "E" stoker for bituminous coal, and the Coxe stoker for anthracite coal. With the enlargement of its offices, this company has added considerably to its staff of draftsmen and engineers. It further announces the organization of six additional erecting units, each under the direction of a superintendent for field work, and the establishment of a service department under the direction of John Morris, who has been associated with the company since its organization.

Charles Haines Williams, of the Chicago Railway Equipment Company, Chicago, was elected first vice-president of the company at its recent annual meeting. Mr. Williams was educated

in the public schools of Baltimore, Md., and at the Baltimore Polytechnic Institute, from which he graduated in 1893, and also took a special course in mechanical drawing and machine design at the Maryland Institute. He spent four years as special apprentice in the Mount Clare shops of the Baltimore & Ohio, working in the machine and locomotive shops, the erecting shops and in the foundry, drawing room and test departments. He left the Baltimore & Ohio to become connected with the Chicago Railway Equipment Company as mechanical inspector, and has been with that company since.

E. W. Richey, who has been elected vice-president of the Standard Forgings Company, Chicago, Ill., as was announced in these columns last week, was born at Richmond, Ind., on June 10, 1876. He entered railway service with the Vandalia at St. Louis, Mo., in September, 1893. In June, 1896, he became connected with the Chicago Terminal Transfer, and the following month he went with the Duluth, Missabe & Northern at Duluth, Minn. He was with the Union Elevated Railroad of Chicago from October, 1897, until September, 1903, when he became general sales agent and secretary of the Standard Forgings Company. On March 1, 1914, he was appointed assistant to the president of A. M. Castle & Co., Chicago, and on August 1, 1916, resigned to become assistant to the president of the Standard Forgings Company, which position he held at the time of his election to the vice-presidency, as noted above.

American Steel Foundries

In a preliminary statement of the business done in 1916, the American Steel Foundries reports that its net profits were \$3,968,570, which is equivalent to 23.21 per cent on the \$17,184,000 of capital stock. Only 0.0017 per cent was earned on the same stock in 1915. The income account for 1916 and the two previous years is summarized as follows:

	1916.	1915.	1914.
*Net earnings	\$4,102,323	\$313,242	\$406,047
Other income	122,987	189,523	87,159
Total	\$4,225,810	\$502,765	\$493,206
Interest, etc.	257,240	472,200	475,155
Net profit	3,968,570	30,565	18,051
Sinking preferred	550,513	344,000	249,532
Surplus	3,418,957	\$313,435	\$231,482

* Net after deduction of manufacturing, selling, administration, etc., expenses and depreciation (\$739,414).
† Deficit.



C. H. Williams

Steel Corporation's Unfilled Tonnage Drops 73,232 Tons

The United States Steel Corporation's unfilled orders on January 31 totaled 11,474,054 tons, a decrease of 73,232 tons from the total of 11,547,286 tons on December 31. The decrease is attributed largely to the temporary let-up in steel buying, but is larger than was expected, it having been thought that the unfilled tonnage would be greater because of lessened production caused by railway congestion.

Car Builders' Association Hires Expert

W. F. M. Goss, dean of the college of engineering and director of the engineering experiment station of the University of Illinois, has resigned to become president of the Railway Car Manufacturers' Association, effective March 1. This association is an organization of 15 manufacturers of freight and passenger cars in this country, including the American Car & Foundry Company, the Barney & Smith Car Company, the Bettendorf Company, the Cambria Steel Company, the Haskell & Barker Car Company, the Harlan & Hollingsworth Corporation, the Keith Car Company, the Laconia Car Company, the Middletown Car Company, the Mount Vernon Car Manufacturing Company, the Osgood-Bradley Car Company, the Pressed Steel Car Company, the Pullman Company, the Ralston Steel Car Company, and the Standard Steel Car Company.

The organization has been in existence for several years, but the officers and members have been unable to give due attention to it on account of pressing duties to their own companies. This led to the election of Mr. Goss as president, who will devote his entire time to furthering the purposes of the association. Among the studies he will make in his new work will be the adaptation of cost accounting to the needs of car manufacturers, the prevention of fires and accidents in car plants, the standardization of the design of cars, or parts of cars, the standardization of car specifications, and ways and means of establishing a greater degree of co-operation between the car builders and the railroads to their mutual advantage. A further economy which it is believed he will effect, will be to prevent the duplication of experimental work by different car builders. If pending congressional legislation is passed legalizing the co-operation of car manufacturers in the promotion of foreign business, Mr. Goss will investigate the best methods of developing that field. In matters of common concern to the railroads and manufacturers relating to car construction, he will have full authority to co-operate with the railways and to give them as much assistance as possible.

The other officers chosen by the association are: Vice-president, J. M. Hansen, president of the Standard Steel Car Company; secretary and treasurer, William Bierman, secretary of the Standard Steel Car Company; executive committee, Mr. Hansen, F. H. Hoffstat, the Pressed Steel Car Company; W. H. Woodin, president, American Car & Foundry Company, and J. S. Ralston, president of the Ralston Steel Car Company.

TRADE PUBLICATIONS

TUBE EXPANDERS.—Catalogue No. 11, recently issued by A. L. Henderer's Sons, Wilmington, Del., describes and illustrates that company's line of expanders, punches, pumps and jacks.

PORTABLE TOOLS.—H. B. Underwood & Co., Philadelphia, have recently issued a catalogue covering their extensive line of portable tools. The catalogue not only shows illustrations of new tools, but also covers many new and interesting features which have been added to the older types. The booklet contains much useful information, and is of especial interest at this time because of the rapid development which has recently taken place in the design of portable tools, and also because of their increased use in railway shops during the last few years.

LONG LIFE FOR WOOD AT LOW COST.—The Barrett Company, New York, has recently issued a 14-page booklet with the subtitle "Where and How to Use Barrett Carbosota Grade 1, Liquid Creosote Oil." The booklet is illustrated with views, showing decay in various structures where untreated wood was used in contact with the ground or with concrete, brick or masonry. Two pages are devoted to a description and a detail plan of a simple and inexpensive wood treating plant, and several pages to the various uses and application of creosote oil, together with the directions for using.

Railway Construction

ATLANTA & ANDERSON (ELECTRIC).—Locating surveys are now being made to build an electric line from Atlanta, Ga., northeast via Jefferson, Commerce, Royston and Hartwell, to Anderson. W. A. Hammel, chief engineer, Atlanta, Ga.

BALTIMORE (MD.) ROADS.—Plans have been completed, it is said, for building an extension of the municipal railway on Key Highway that will provide connections with all the steam railroads entering Baltimore, Md. A contract for rails and appurtenances for the line on the third section from Lawrence to McComas streets, has been given by the board of awards to the Bethlehem Steel Company at its bid of about \$14,000, and the Consolidated Engineering Company will carry out the track laying. A contract for an extension from Key Highway to President street for a connection with the Pennsylvania Railroad may be let within the next three weeks. A connection with the Baltimore & Ohio, at Lawrence street, Locust Point, has already been made, and the line will be extended to Port Covington for a connection with the Western Maryland, as soon as McComas street is opened and paved.

BURLINGTON, SOUTH CHICAGO TERMINAL RAILROAD.—Incorporated with a capital of \$1,500,000 to build from One Hundredth street, Chicago, Ill., southwesterly 10 miles to the city limits. The incorporators are officers of the Chicago, Burlington & Quincy.

CHRISTIE & EASTERN.—Organized in Louisiana to build a line to develop timberlands of the Peavy-Wilson Lumber Company, Shreveport, La.; the Pawnee Lumber Company and the Crowley & Spender Lumber Company. The projected route is from Christie on the Kansas City Southern, southeast to Longleaf, about 60 miles. A. J. Peavy, president, Shreveport.

COLORADO, KANSAS & OKLAHOMA.—Preliminary surveys have been made for an extension of the line from Scott City, Kans., to Forgan, Okla. Construction is expected to be started some time this year. B. L. Allen, chief engineer, Scott City, Kans.

GREAT NORTHERN.—It is planned to enlarge the yard at Hilliard, Wash. The work includes the addition of five tracks 4,000 ft. long.

HAMPTON & Langley FIELD RAILWAY (ELECTRIC).—Incorporated in Virginia with \$25,000 capital to build an electric line from Hampton, Va., north to the Langley aviation field proving grounds on Bock river, about four miles. The line will be built for the company by the Newport News & Hampton Railway, Gas & Electric Co., and the work includes constructing a pile trestle to be 1,800 ft. long. It will be operated under traffic agreement by the N. N. & H. Ry. G. & E. Co. J. N. Shannahan, president, Newport News, F. W. Darling, vice-president, H. R. Booker, secretary and treasurer.

INTERNATIONAL RAILWAY (ELECTRIC).—This company will build an extension along the River road from the Grand Island Ferry Terminal by the works of the Wickwire Steel Company, near Buffalo, N. Y. The work will be carried out by company forces.

KIRBY PLANING MILL COMPANY.—According to press reports, this company, with headquarters at Thomasville, Ga., plans to build an extension from Boston, Ga., to a connection with the Seaboard Air Line, about 10 miles.

KNOXVILLE, SEVIERVILLE & EASTERN.—According to press reports work is expected to be finished by July, 1917, on the extension building under the name of the Pigeon River Railroad from Sevierville, Tenn., south via Gatlinburg to a point near the South Carolina line about 26 miles. (October 20, 1916, p. 719.)

LOS ANGELES & SALT LAKE.—This road is building a line from Pico, Los Angeles county, Cal., through Whittier, Fullerton, Orange county, and Anaheim, to Santa Ana, about 25 miles. The contract for the grading was awarded to R. Sherer & Co., Los Angeles, and the track laying and bridge work will be done by railroad forces. The work involves a maximum curvature of 10 deg., and a maximum grade of 1.5 per cent. Depots will be built at Whittier, Fullerton, Anaheim and Santa Ana. One 36-ft. deck

girder span, two 50-ft. through girder spans, two 75-ft. through girder spans and one 90-ft. through girder span will be constructed. A. Maguire, chief engineer, Los Angeles, Cal.

MISSISSIPPI ROADS.—According to press reports from Ansley, Miss., the Western Lumber Company is building a railroad from Logtown to Ansley, about 10 miles.

PENNSYLVANIA RAILROAD.—Contracts are expected to be let soon for piercing a 300-ft. tunnel, also a 350-ft. tunnel on the line of the Wheeling Coal Railroad. One of the tunnels will be about 5 miles east of Elm Grove, Pa., and the other about 8 miles east of the same place. The plans of the Wheeling Coal Railroad call for a line from a point on the Pennsylvania-West Virginia state line near Majorsville to a connection with the Wheeling Terminal Railway at Wheeling, W. Va., and in Pennsylvania from Majorsville east to Marianna, where connection is to be made with the Millsboro branch of the Pennsylvania Railroad (August 4, 1906, p. 213.)

PIGEON RIVER RAILROAD.—See Knoxville, Sevierville & Eastern.

PORT ANGELES & GRAYS HARBOR.—This company, incorporated under the laws of the state of Washington, will begin construction of a new line shortly to run from Port Angeles, Wash., to Grays Harbor, a distance of 130 miles. It is estimated that this undertaking will cost between \$4,500,000 and \$5,000,000. No contracts have been awarded, but work will probably commence about May 1. J. W. Lindsay, Port Angeles, Wash., is one of the promoters.

TAMPA SOUTHERN.—Incorporated in Florida with \$200,000 capital, to build a line from Tampa, Fla., or from a point near that place southward to Bradenton and Sarasota, about 57 miles. The company may also build branch lines. D. C. Gillet, president; W. A. Carter, secretary and treasurer, and E. L. Sparkman, auditor, Tampa, Fla.

VIRGINIA IRON, COAL & COKE COMPANY.—According to press reports this company is building a spur from the Rome & Northern, about one mile north of Shackelton, Ga., to the L. S. Colyar property. Another spur is also being built from Gore to a point on Taylors Ridge, about one mile north to a new line. The construction work is to be carried out by the Standard Cooperage Company of Shackelton.

WHEELING COAL RAILROAD.—See Pennsylvania Railroad.

RAILWAY STRUCTURES

BIRMINGHAM, ALA.—Negotiations are in progress between the railroads interested and the city officers of Birmingham, Ala., for the construction of a viaduct on Twenty-first street, Birmingham, over the tracks of the Southern Railway System (including tracks of Southern Railway Company and Alabama Great Southern), the Seaboard Air Line and the Louisville & Nashville. The cost of the work is to be paid jointly by the several railway companies and by the city. An agreement has practically been reached, and it is understood that the work will be carried out under the supervision of the Southern Railway engineers. Final details of the plans, however, have not yet been worked out, nor has a contract between the city and interested lines been signed.

BURLINGTON, Vt.—The Rutland Railroad has plans made, it is said, for building a new roundhouse at Burlington, Vt.

CHICAGO, ILL.—The Elgin, Joliet & Eastern has awarded a contract to the Great Lakes Dredge & Dock Company, of Chicago, for the reinforcing of the masonry supporting its bridge over the Grand Calumet river at this point. The total cost of this undertaking will approximate \$80,000. Work is expected to begin in the near future.

KINGSPOINT, TENN.—Plans are being made by the Carolina, Clinchfield & Ohio, it is said, to build a passenger station at Kingsport at a cost of about \$50,000.

Mt. VERNON, N. Y.—Bids are wanted until February 28, at the office of the Bronx Parkway Commission, Bronxville, N. Y., for the construction of the Broad street Viaduct over the Bronx River Parkway Reservation and the tracks of the New York Central, Harlem division, near Mount Vernon, N. Y. The viaduct will consist of six reinforced concrete arch spans ranging from 85 ft. to 94 ft., and with approaches will be about 750 feet long.

Railway Financial News

MISSOURI, KANSAS & TEXAS.—See an abstract of the Coverdale & Colpitts report on this property elsewhere, and also see editorial comments thereon.

J. W. Kendrick, of Chicago, has just completed his report on the property, which report, it is understood, was made for Speyer & Co., New York, and in his estimate of the needs of the property Mr. Kendrick gets a total figure of \$65,000,000, to be spent during the next eight years for rehabilitation and improvements.

MISSOURI & NORTH ARKANSAS.—A suit has been filed by the committee representing holders of the majority of the outstanding \$6,000,000 notes for a foreclosure sale of the Missouri & North Arkansas, which runs from Joplin, Mo., to Helena, Ark.

NEW ORLEANS & NORTHEASTERN.—See Southern Railway.

SOUTHERN PACIFIC.—In an editorial note in last week's issue of the *Railway Age Gazette* mention was made of the fact that the Southern Pacific's operating income for December, 1916, was \$2,216,000, a decrease of \$617,000, as compared with December, 1915. These figures are for the 7,063 miles of line reported under Southern Pacific to the Interstate Commerce Commission. The annual report of the company and the monthly statements to stockholders cover the entire system mileage—11,094 miles—in December, 1916, and for this mileage the operating income in December, 1916, was \$3,687,000, a decrease of \$72,000, as compared with December, 1915.

SOUTHERN RAILWAY.—It is understood that arrangements are being made for a new mortgage for \$16,000,000 on the New Orleans & Northeastern, which will provide for the retirement of the present outstanding funded debt of \$8,982,000, and for future additions and betterments. Almost all of the outstanding stock of the New Orleans & Northeastern has been recently acquired by the Southern Railway.

WESTERN MARYLAND.—The Pennsylvania Public Service Commission has approved of the merger of the subsidiaries of the Western Maryland in Pennsylvania with the parent company.

MILEAGE OF CHILEAN RAILWAYS.—On January 1, 1916, there were 8,863 km. (5,507 miles) of railways in operation in the Republic of Chile, and 298 km. (185 miles) of new lines under construction.

NEW FRENCH LOCOMOTIVE WORKS.—It is stated that a new company, "Le Matériel Rouleur," has been organized in France with a share capital of £600,000 (\$2,916,000), in which all the large works, including Schneiders of Creusot, are financially interested. The object is to produce rolling stock, including locomotives, at a quick rate.—*The Engineer, London*.

CHILE ASKS FOR BIDS ON RAILWAY CARS.—Bids have been asked for through the Chilean press on 160 freight cars, of 20 tons, and 150 20-ton cattle cars. Bids are to be opened on March 31, 1917, and should be presented through a local agent, as a deposit has to be made to guarantee delivery, and the plans and specifications are available only at the Department of Materials in Santiago.—*Commerce Report*.

PULVERIZED COAL FOR BRAZILIAN RAILWAYS.—Article 75, Section XXI of the Brazilian budget law for 1917, authorizes the President to spend with the Central Railroad of Brazil up to 2,000,000 milreis (\$480,000) for the acquisition of the necessary material to construct a mill for the pulverization of domestic coal, the capacity of which shall be 50,000 tons a year; for the purchase of 12 locomotives which shall burn Brazilian coal; and for the purchase of the rights to burn pulverized coal in locomotives. Section XXXV of the same article places the maximum of coal or other fuel which the Central Railway of Brazil may acquire at 250,000 tons.